NTNU

MASTER OF SCIENCE IN ENGINEERING
MASTER OF SCIENCE IN NATURAL SCIENCES
MASTER OF PHILOSOPHY

INTERNATIONAL MASTER´S PROGRAMMES
2006 - 2007

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INTRODUCTION

This is a guide for students who are enrolled in one of the International Master's Degree Programmes at NTNU, and who are in the process of planning or completing their degree.
It contains an updated outline of the programmes, with course descriptions for each of the individual International Master's Degrees.

As this catalogue is revised annually, only the latest edition is valid. This edition is valid until the end of the academic year 2006/2007.

Good luck with your studies,

Student and Academic Division

NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

NTNU consists of 7 faculties. The University has over 18 000 students, and approximately 3 800 employees.

Although the University has a main profile in technological and the natural sciences it also has a full range of degrees in the social sciences, arts, humanities, medicine, and psychology. NTNU has a number of non-degree courses, such as those for practising musicians and teachers, as well as for artists in the visual arts.

NTNU is concerned with creativity and innovation.A University where its students can meet the challenges of a new era. NTNU is concerned with interrelations at the macro- and micro-levels, and contributes to developing society that is in harmony with our natural resources in interplay with traditional and new knowledge.

GUIDE TO THE INTERNATIONAL MASTER´S PROGRAMMES

TABLES
The tables show the courses in relation to the overall degree programme. Here is a guide to the specific boxes:

Ex (Course year and time of examination)
This box states which course year and examination period this examination can be taken for the first time.
The examination period is marked a for the August examination, h for the autumn examination and v for the spring examination.

Course code
The course code comprises 6 or 7 digits.

Course title
This box give the course title in abbrevated form.

Note
This box includes any references to footnotes.

Weekly hours in summer, autumn and spring semesters
The boxes provide information about the weekly number of lessons each semester in each course and which semester the teaching is given.
These weekly hours are divided into:

- F - Lecture hours per week
- Ø - Exercise hours with instruction
- S - Additional hours with self study

Cr (credits)
The credits give the weighting of each course in the degree programme. Credits are given according to the European Credit Transfer System (ECTS).

Examination
The mark x shows whether the course has an examination or not.

DESCRIPTION OF COURSES FOR THE INTERNATIONAL MASTER´S PROGRAMMES

The description of courses provides a survey of the topics covered in each course. This description also gives the following information:

Course title
The course catalogue show the complete and the abbrevated course title in English.

Course responsibility
This indicates the teacher(s) who is responsible for the teaching etc. and who is the contact person for students and others.

Weekly hours
This provides information about the weekly hours of each course per semester and the semester teaching is given.

Time/venue
Teaching time and location will be announced on the web.

Examination
This provides information about the examination date for the course in the academic year. (The examination date is only determined well in advance for courses that are also part of the Master i technology degree. Other courses will have the examination date decided after students have been registered for the examination.)

Examination support
Information about permitted examination support is given at each examination. The following codes are used:

A - All written and handwritten examination support materials are permitted.
All calculators* are permitted.

B - All written and handwritten examination support materials are permitted. Certain, specified calculator** is permitted.

C - Specified written and handwritten examination support materials are permitted. Certain, specified calculator** is permitted.

D - No written or handwritten examination support materials are permitted. Certain, specified calculator** is permitted.

Oral examination has code D unless stated otherwise.

* When "all calculators" are allowed, the following rules apply:
- No possibility of communication with other sources of data is allowed.
- Cannot be connected to mains electricity.
- Is not to make a noise.
- Is not to have any other equipment for reading data than a display.
- Is only to be one - 1 - unit.
- Is only to be pocket sized.

** "Certain, specified calculator" means a calculator with simple, numerical and trigonometrical functions such as +, -, sine, cosine etc. The type of calculator is to be easy for examination invigilators to recognize. (The specified calculator is HP30S).

Exercises
This indicates if there are exercises in a course and whether the exercises are compulsory or voluntary. (More details about exercises are given in the Description of Courses). The following codes are used for exercises:
O - Compulsory exercises
F - Voluntary exercises
I - No exercises

Grades: All courses have grades based on the letter scale, where A is the highest passing grade and F is fail.

MSC-PROGRAMME IN COASTAL AND MARINE CIVIL ENGINEERING

This Master of Science degree programme in Coastal and Marine Civil Engineering is an integrated, two year study programme for Norwegian and foreign students. Thus the programme is designed according to the current framework for engineering graduate studies at NTNU.

Norwegian students can enrol in the full M.Sc programme, or select individual courses from the programme in their study curriculum.

Foreign students could be admitted through the Quota Programme, with participants from developing countries and from Central and Eastern Europe. Students with other sources of financing might also be admitted to the full M.Sc programme.

Foreign exchange students could select individual courses from the programme, provided they have the necessary qualifications for the course.

The first year of the study consists of basic courses on graduate level. The second year provides a specialization in the following subjects:

- Port Engineering
- Coastal Engineering
- Marine Civil Engineering
- Arctic Offshore Engineering
- Marine Geotechnics

In addition to the core engineering subjects in the programme, course offers are included from other Master degree programmes at NTNU:

- M.Sc in Urban Ecological Planning
- M.Phil in Social Change

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN COASTAL AND MARINE CIVIL ENGINEERING (MSCOASTMAR)

Term 1, 2, 3 and 4

Ex	Subject no	Subject title	Note	Autumn			Spring			Cr	Exam	Specialization				
				F	Ø	S	F	Ø	S			1	2	3	4	5
1h	TBA4265	MARINE PHYS ENV		3	2	7				7,5	x	o	o	o	o	o
1h	TBA4305	TRANSPORT SYSTEMS	1	3	3	6				7,5	x	v	v	v	v	v
1h	TBA5100	THEORETICAL SOIL MEC		3	2	7				7,5	x	o	o	o	o	o
1h	TGB4235	SPREADING POLLUTION	1	3	2	7				7,5	x	v	v	v	v	v
1h	TKT5100	DUR/MAINT/REP CONCR		3	2	7				7,5	x	o	o	o	o	o
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	o	o	o	o	o
1v	TBA4115	GEOTECH STRUCTURES	2				3	3	6	7,5	x	v	v	v	v	o
1v	TBA4145	PORT/COAST FACILITY	2				3	2	7	7,5	x	v	o	v	v	v
1v	TBA4270	COASTAL ENGINEERING	2				3	2	7	7,5	x	o	v	v	v	v
1v	TBA4275	DYNAMIC RESPONSE	2				3	2	7	7,5	x	v	v	o	o	v
1v	AAR4230	PLAN IN DEV COUNTRY	3,4				3	1	8	7,5	x	v	v	v	-	v
2h	TBA4730	COASTAL/MAR ENG SPEC	5			36				22,5	x	o	o	o	o	o
2h	-	ARCTIC OFFSHORE ENG	6							7,5	x	-	-	-	o	-
2h	GEOG3506	GEO HEALTH AND DEV	7	2	1	9				7,5	x	v	v	v	-	v
2h	GEOG3561	GENDER SOC CHANGE	7	2	1	9				7,5	x	v	v	v	-	v
		Master Thesis	8													
2v	TBA4920	COAST MAR CIV ENG								30,0						

o = compulsory courses
v = optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) Select one of the subjects.
2) Select a minimum of two of the subjects.
3) Select up to one subject. Other available subjects could be selected if approved by the professor in charge.
4) Number of participants might be restricted.
5) Specialization project work (11,25 Credits) should preferably be taken in co-operation with partner institutions. For Arctic Offshore Engineering the project might be taken at UNIS, Svalbard. Select the theory part among the course offer in subject TBA4730. Following approval by the professor in charge, one of these might be replaced by another available theory part.
6) Course offer for students in Arctic Offshore Engineering taking the term at UNIS, Svalbard.
7) Select one subject. Other available non-technical subjects might be chosen provided approval by professor in charge.
8) Master thesis should preferably be taken in co-operation with partner institutions. Students in Arctic Offshore Engineering might take the Master thesis at UNIS, Svalbard.

Specialization:
1 Coastal Engineering
2 Port Engineering
3 Marine Civil Engineering
4 Arctic Offshore Engineering
5 Marine Geotechnics

FACULTY OF INFORMATION TECHNOLOGY, MATHEMATICS AND ELECTRICAL ENGINEERING

MSC-PROGRAMME IN ELECTRIC POWER ENGINEERING
(MSELPOWER)

Term 1 and 2 (Autumn 2006 and Spring 2007)
Term 3 and 4 (Autumn 2007 and Spring 2008)

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Comp/ Opt.
1h	TET4115	POWER SYST ANALYSIS		4	2	6				7,5	x	o
1h	TET4160	INSULATING MATERIALS		3	5	4				7,5	x	o
1h	TET4190	POWER ELECTRONICS RE		4	4	4				7,5	x	o
1h	TET5100	POWER ENG UPDATES					4	4	4	7,5	x	o
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	v
1v	TEP4220	ENERGY/ENV CONSEQUEN					4	1	7	7,5	x	v
1v	TET4120	EL MOTOR DRIVES					4	4	4	7,5	x	v1
1v	TET4170	EL INSTALLATIONS					3	3	6	7,5	x	v
1v	TET4180	POWER SYST STABILITY					3	6	3	7,5	x	v1
1v	TET4185	POWER MARKETS					3	4	5	7,5	x	v1
1v	TET4195	HIGH VOLTAGE EQUIPM					4	4	4	7,5	x	v1
1v	TET4200	MAR OFF ELEKTROINST					4	4	4	7,5	x	v
		Compulsory and optional courses	1									
2h		Specialization including project work	2							22,5		
2h		Optional course	2							7,5		
		Master Thesis	2									
2v	TET4900	ELEC POW TECHN								30,0		

o - compulsory courses
v - optional courses
v1 - at least three of these courses must be chosen

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) The courses must each semester be selected so that the total weighting amounts to 30 credits (Cr).
2) The plan for term 3 and 4 is under compilation.

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN GEOTECHNICS AND GEOHAZARDS
(MSGEOTECH)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
1h	TBA4110	SOIL INVESTIGATIONS		3	6	3				7,5	x
1h	TBA5100	THEORETICAL SOIL MEC		3	2	7				7,5	x
1h	TBA5150	GEOHAZARDS/RISKAN		3	3	6				7,5	x
1h	TKT4130	CONTINUUM MECHANICS		4	1	7				7,5	x
1v	TBA4115	GEOTECH STRUCTURES					3	3	6	7,5	x
1v	TBA5155	LANDSLIDES AND SLOPE					3	3	6	7,5	x
1v	TKT4135	MECH OF MATERIALS					4	1	7	7,5	x
1v	TKT4201	STRUCTURAL DYNAMICS					3	3	6	7,5	x
2h	TBA4700	GEOTECH ENG SPEC				36				22,5	x
2h	TGB5100	ROCK ENGINEERING AC		3	2	7				7,5	x
		Master Thesis									
2v	TBA4900	GEOTECH ENGINEERING								30,0	

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN HYDROPOWER DEVELOPMENT
(MSB1)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
1h	TVM5105	HYDROLOGY HYDROP BC		4	4	4				7,5	x
1h	TVM5115	DAM ENGINEERING BC		4	4	4				7,5	x
1h	TVM5125	HYDRAULIC DESIGN BC		4	4	4				7,5	x
1h	TVM5135	PLANN HYDROPOWER BC		4	4	4				7,5	x
1v	TGB5110	GEOLOGY TUNNELL BC					4	4	4	7,5	x
1v	TVM5130	HYDROPOWER PROJECT						12	12	15	-
1v	TVM5140	ENVIRONM/ECONOMI BC					4	4	4	7,5	x
2h	TGB5100	ROCK ENGINEERING AC		3	2	7				7,5	x
2h	TVM5150	RIVER SYSTEM ANAL AC		3	2	7				7,5	x
2h	TVM5160	HEADWORKS AND SED AC		3	2	7				7,5	x
2h	TVM5170	SOCIAL IMPACT ASS AC		3	2	7				7,5	x
		Master Thesis	1								
2v	TVM4915	HYDROPOWER PLANNING								30,0	
2v	TVM4920	HYDROPOWER HYDROLOGY								30,0	
2v	TVM4925	HYDROPOWER HYDRAULIC								30,0	

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) Choose one of the thesis.

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN INDUSTRIAL ECOLOGY (MSINDECOL)

Term 1, 2, 3 and 4

Ex	Subject no	Subject title	Note	Autumn			Spring			Cr	Exam	Specialization		
				F	Ø	S	F	Ø	S			1	2	3
1h	TEP4223	LCA/ECO-EFFICIENCY		4	1	7				7,5	x	o	o	o
1h	TIØ4195	ENV MAN CORP SOC RES		4	1	7				7,5	x	v	v	o
1h	TVM4162	INDUSTRIAL ECOLOGY		3	2	7				7,5	x	o	o	o
1h	-	OPTIONAL COURSES	1							7,5				
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	o	o	o
1v	TEP4220	ENERGY/ENV CONSEQUEN					4	1	7	7,5	x	o	v	v
1v	TPD5100	ECODESIGN AC					3	2	7	7,5	x	v	o	v
1v	TVM4160	MATERIAL FLOW ANALYS					3	2	7	7,5	x	o	o	v
1v	POL1003	ENVIRONM POLITICS					2	2	8	7,5	x	v	v	o
1v	-	OPTIONAL COURSES	1							7,5				
2h	TPK4160	VALUE CHAIN CONTR		3	2	7				7,5	x	v	o	v
2h	-	OPTIONAL COURSES	1							7,5/				
										15,0	x	v	v	v
		Project and thesis preparation course	2											
2h	TEP5100	INDECOL PROJECT				24				15,0	-	v	v	v
2h	TVM5175	INDECOL PROJECT			12	12				15,0	-	v	v	v
		Master Thesis	3											
2v	TEP4930	INDUSTRIAL ECOLOGY								30,0				
2v	TVM4930	INDUSTRIAL ECOLOGY								30,0				

o = compulsory courses
v = optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) According to their disciplinary background, students choose from both the list of Industrial Ecology courses and from the list of Master and PhD level courses. The combination of courses must be approved by the programme. The courses are selected so that the total weighting each term amounts to 30 credits (Cr).
2) In the first semester, students will be assigned to an academic supervisor, who is associated with one of many participating departments. This supervisor guides the student through the programme. The students choose optional courses, project and thesis preparation courses according to their specialization and in agreement with their supervisors. Student choose one of the listed project courses below.
3) Choose one of the thesis.

Specialization:
1 Environmental Systems Analysis
2 Strategic Design of Product Systems
3 Environmental Politics and Management

FACULTY OF INFORMATION TECHNOLOGY, MATHEMATICS AND ELECTRICAL ENGINEERING

MSC-PROGRAMME IN INFORMATION SYSTEMS
(MSINFOSYST)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Comp/ Opt.
1h	TDT4245	COOPERATION TECHN		3	2	7				7,5	x	o
1h	TDT4250	INFO SYSTEMS MODELL		3	2	7				7,5	x	o
1h	TDT4290	CUSTOMER DRIVEN PROJ			2	22				15,0	-	o
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	o
1v	TDT4215	KNOW DOCUMENT COLL					3	2	7	7,5	x	o
1v	TDT4220	COMP SYST PERFO EVAL	1				4	1	7	7,5	x	v
1v	TDT4240	SOFTWARE ARCHITECT	1				3	2	7	7,5	x	v
1v	TDT4280	DISTRIB INT AGENTS	1				2	3	7	7,5	x	v
1v	TIØ4270	HUMAN RES MANAGEMENT	1				2	3	7	7,5	x	v
2h	TDT4210	HEALTHCARE INFORM	2	3	2	7				7,5	x	v
2h	TDT4730	INF SYSTEMS SPEC		2	2	32				22,5	x	o
2h	TIØ4135	ICT ECONOMICS	2	3	2	7				7,5	x	v
2h	TIØ4180	INNOV/INFO MANAGEM	2	3	2	7				7,5	-	v
2h	POL1004	GLOBALIZATION	2	2	2	8				7,5	x	v
		Master Thesis										
2v	TDT4900	COMPU INFO SCIENCE								30,0		

o - compulsory courses
v - optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) Two optional courses must be chosen.
2) One optional course must be chosen.

FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

MSC-PROGRAMME IN LIGHT METALS PRODUCTION
(MSLIMETAL)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
1h	TMT4155	HETEROGEN EQUILIBRIA		4	2	6				7,5	x
1h	TMT4185	MATR SCIENCE/ENG		4	2	6				7,5	x
1h	TMT4295	ELECTROLYTIC PROCESS		3	2	7				7,5	x
1h	TMT4325	REFIN/RECYL METALS		3	2	7				7,5	x
1v	TMT4150	REFRACTORIES					4	2	6	7,5	x
1v	TMT4165	MATR/ELECTR CHEM PRO					2	6	4	7,5	-
1v	MT8300	ELECTR LIGHT MET 2					3	2	7	7,5	x
1v	MT8301	CARBON MAT TECHN					2	2	8	7,5	x
2h	TMT4220	MECH PROP ENG MATR 1		4	1	7				7,5	x
2h	TMT5730	PROC MET/ELECTR SPEC		2	26	8				22,5	x
		Master Thesis	1								
2v	TMT4900	MAT CHEM ENER TECHN								30,0	
2v	TMT4905	MATR TECHN								30,0	

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) Choose one of the thesis.

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1, 2, 3 and 4

MARINE STRUCTURES

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Specialization 1	Specialization 2
		Compulsory courses											
1h	TMR4175	MARINE HYDRODYN BC 2	1			12				7,5	x	o	o
1h	TMR4190	ELEM METHODS STRUCT		3	6	3				7,5	x	o	o
1h	TMR4215	SEA LOADS		3	6	3				7,5	x	o	o
1v	TMR4185	MARINE DYNAMICS	1						12	7,5	x	o	o
1v	TMR4195	DESIGN OFFSHOR STRUC					3	6	3	7,5	x	o	v
		Optional courses											
1h	TMR4115	DESIGN METHODS		3	6	3				7,5	x	v	v
1h	TMR4200	FATIGUE/FRACTURE		3	6	3				7,5	x	v	v
1h	TMR4235	STOCH THEORY SEALOAD		3	6	3				7,5	x	v	v
1h	TMR4275	MOD/SIM/AN DYN SYS		3	6	3				7,5	x	-	v
1h	TPG5100	MATH/COMPUTER METHOD		2	8	2				7,5	-	v	-
1v	TMR4205	BUCKLING/COLLAPS STR	2				3	6	3	7,5	x	v	-
1v	TMR4217	HYDRO HIGH-SPEED VEH	2				3	6	3	7,5	x	v	v
1v	TMR4220	NAVAL HYDRODYNAMICS	2				3	6	3	7,5	x	v	v
1v	TMR4225	MARINE OPERATIONS					3	6	3	7,5	x	v	v
1v	TMR4230	OCEANOGRAPHY					3	6	3	7,5	x	v	v
1v	TTK4190	GUIDANCE AND CONTROL					3	2	7	7,5	x	v	v
		Compulsory courses											
2h	TMR4700	MARINE STRUC SPEC				36				22,5	x		
		Master Thesis											
2v	TMR4900	MARINE STRUCTURES								30,0			

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring.

1) Compulsory course for students without the equivalent background.
2) Select two of the courses for specialization in marine hydrodynamics. The students receive further information from their supervisor.

Specialization:
1. Marine structures
2. Marine hydrodynamics

o = compulsory course
v = optional course

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1, 2, 3 and 4

MARINE SYSTEMS ENGINEERING

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Specialization 1	Specialization 2	Specialization 3
		Compulsory courses												
1h	TMR4115	DESIGN METHODS		3	6	3				7,5	x	-	v	o
1h	TMR4223	MARINE MACHINERY				12				7,5	x	o	o	v
1h	TMR4253	MARINE SYST DESIGN				12				7,5	x	-	o	o
1h	TMR4275	MOD/SIM/AN DYN SYST		3	6	3				7,5	x	o	v	v
1h	TMR4290	DIESEL-EL PROP SYST		3	6	3				7,5	x	o	v	v
1h	TMR4295	DES OF MECH SYST		3	6	3				7,5	x	o	o	-
1v	TMR4130	RISK ANALYSIS SAFETY					2	8	2	7,5	-	-	o	v
1v	TMR4280	INTERNAL COMB ENGINE					3	6	3	7,5	x	o	v	-
1v	TMR4265	OPERATION TECHN BC							12	7,5	x	o	o	o
		Optional courses												
1h	TMR4175	MAR HYDRODYN BC2				12				7,5	x	-	v	v
1h	TMR5120	DESIGN MAR VEHICLES				12				7,5	-	-	v	v
1h	TPG5100	MATH/COMPUTER METHOD		2	8	2				7,5	-	-	v	v
1v	TMR4120	UNDERWATER ENG BC					3	6	3	7,5	-	-	v	v
1v	TMR4125	BUILD SHIPS/PLATFORM					3	3	6	7,5	x	-	v	-
1v	TMR4135	FISH VENELL WORK DES					2	8	2	7,5	x	-	-	v
1v	TMR4140	DES MAR PROD PLANTS					3	6	3	7,5	x	-	-	v
1v	TMR4145	PROD MOD DESIGN					2	2	8	7,5	-	-	-	v
1v	TMR4185	MARINE DYNAMICS							12	7,5	x	v	v	v
1v	TMR4220	NAVAL HYDRODYNAMICS					3	6	3	7,5	x	v	-	v
1v	TMR4230	OCEANOGRAPHY					3	6	3	7,5	x	-	-	v
1v	TMR4280	INTERNAL COMB ENGINE					3	6	3	7,5	x	-	v	-
2h	TMR4705	MARINE SYST SPEC				36				22,5	x			
2h		**Optional course from another studyprogram or specialization**								7,5	x			
		Master Thesis												
2V	TMR4905	MARINE SYST ENG								30,0				

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis, Spring

*) MSC-PROGRAMME IN MARINE TECHNOLOGY - Marine systems is offered every year, starting in August, with preliminary application deadline 1. December the previous year. E-mail and web-site for further information: mscadm@ivt.ntnu.no (http://www.marin.ntnu.no/msc).

Specializations:
1. Marin Engineering
2. Technical Operation of Marine Systems
3. Design of Marine Systems

o = compulsory course
v = optional Course

According to their specialization the students will be assigned to an academic supervisor in the first or beginning of the second semester. The combination of coruses must be approved by the programme. The courses are selected so that the total weighting each term amounts to 30 credits (Cr).

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1, 2, 3 and 4

NAUTICAL SCIENCE

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
		Compulsory courses									
1h	TMA5100	CALCULUS 4		4	2	6				7,5	x
1h	TMR4210	MARINE HYDRODYN BC		4	6	2				7,5	x
1h	TMR4215	SEA LOADS		3	6	3				7,5	x
1h	TTT4140	FUND OF NAVIGATION		4	2	6				7,5	x
1v	TMR4185	MARINE DYNAMICS							12	7,5	x
1v	TMR5230	NAUTICAL SCIENCE BC					3	6	3	7,5	x
1v	TTT4150	NAVIGATION SYSTEMS					4	2	6	7,5	x
		Optional courses									
1v	TMR4130	RISK ANALYSIS SAFETY	1				2	8	2	7,5	-
1v	TMR4220	NAVAL HYDRODYNAMICS	1				3	6	3	7,5	x
1v	TMR4225	MARINE OPERATIONS	1				3	6	3	7,5	x
1v	TMR4230	OCEANOGRAPHY	1				3	6	3	7,5	x
1v	TMR4240	MARINE CONTROL SYST	1				3	6	3	7,5	x
1v	TTK4190	GUIDANCE AND CONTROL	1				3	2	7	7,5	x
		Compulsory courses									
2h	TMR5240	NAUTICAL SCIENCE AC		3	6	3				7,5	x
2h	TMR5250	NAUTICAL SC PROJECT			12					7,5	-
2h	TMR5260	NAUTIC SC SPEC SUBJ		2	8	2				7,5	x
		Optional courses									
2h	TMR4235	STOCH THEORY SEALOAD		3	6	3				7,5	x
2h	TMR5180	CONTROL ENGINEERING		3	6	3				7,5	x
		Master Thesis									
2v	TMR4925	NAUTICAL SCIENCE								30,0	

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis, Spring

*) MSC-PROGRAMME IN MARINE TECHNOLOGY - Nautical Science, is offered every year, starting in August, with preliminary application deadline 1. December the previous year. E-mail and web-site for further information: mscadm@ivt.ntnu.no (http://www.marin.ntnu.no/msc).

1) It is recommended to study this course in parallel to TTK4190 Guidance, Navigation and Control.

o = compulsory course
v = optional Course

FACULTY OF NATURAL SCIENCES AND TECHNOLOGY

MSC-PROGRAMME IN MEDICAL TECHNOLOGY (MSMEDTEK)

Term 1 and 2 (Autumn 2006 and Spring 2007)
Term 3 and 4 (Autumn 2007 and Spring 2008)

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Specialization 1	2	3	4	5*
1h	IT2702	ARTIFICIAL INT (AI)		2	3	7				7,5	x	-	v	v	-	
1h	IT3604	SYSTEMS DESIGN ORG		2	2	8				7,5	-	-	v	-	-	
1h	MFEL1010	MED FOR NON MEDSTUD		3	3	6				7,5	x	o	o	o	o	
1h	TDT4210	HEALTHCARE INFORM		3	2	7				7,5	x	-	o	v	-	
1h	TDT4230	VISUALIZATION		4	1	7				7,5	x	-	-	v	-	
1h	TDT4245	COOPERATION TECHN		3	2	7				7,5	x	-	v	-	-	
1h	TDT4250	INFO SYSTEMS MODEL		3	2	7				7,5	x	-	v	-	-	
1h	TFY4225	NUCLEAR/RAD PHYS		4	3	5				7,5	x	-	-	-	o	
1h	TFY4265	BIOPHYSICAL MICROMET		3	3	6				7,5	x	-	-	-	o	
1h	TFY4310	MOLECULAR BIOPHYSICS		4	3	5				7,5	x	-	-	-	o	
1h	TMA4270	MULTIVAR ANALYSIS		4	1	7				7,5	x	-	-	o	-	
1h	TTK4160	MEDICAL IMAGING		4	4	4				7,5	x	o	-	-	-	
1h	TTT4125	INFO THEORY COD/COMP		4	1	7				7,5	x	o	-	-	-	
1h	TTT4155	REMOTE SENSING		3	2	7				7,5	x	o	-	-	-	
1v	-	EXPH IN TEAM INT PROJ						5	7	7,5	-	o	o	o	o	
1v	DT8112	RES TOP HEALTH INFO					2	2	8	7,5	-	-	o	-	-	
1v	IT2801	INFO RETRIEVAL					2	2	8	7,5	x	-	-	v	-	
1v	MOL4010	MOL BIOL FOR TECH					3	3	6	7,5	x	-	-	o	-	
1v	MTEK3001	APPL BIOINFORMATICS					3	3	6	7,5	x	-	-	o	-	
1v	TDT4213	CLINICAL INFO SYSTEM					3	2	7	7,5	x	-	o	-	-	
1v	TDT4215	KNOW DOCUMENT COLL					3	2	7	7,5	x	-	v	-	-	
1v	TDT4240	SOFTWARE ARCHITECT					3	2	7	7,5	x	-	v	-	-	
1v	TFY4315	BIOPHYSICS SPECIAL					3	2	7	7,5	x	-	-	-	o	
1v	TFY4320	MEDICAL PHYSICS					3	2	7	7,5	x	v	-	-	o	
1v	TKT4150	BIOMECHANICS					4	1	7	7,5	x	-	-	-	v	
1v	TMA4300	MODERN STAT METHODS					3	2	7	7,5	x	-	-	v	-	
1v	TTK4165	SIGNAL PROC MED IMAG					2	6	4	7,5	x	o	-	-	-	
1v	TTK4170	MOD/IDENT BIOL SYS					4	4	4	7,5	x	o	-	-	v	
1v	TTT4135	MULTIMEDIA SIGN PROC					3	3	6	7,5	x	v	-	-	-	
2h	IT3706	KNOWLEDGE REPR MOD		2	3	7				7,5	x	-	o	-	-	
2h	TDT4230	VISUALIZATION		4	1	7				7,5	x	o	-	-	-	
2h	TDT4287	ALGORITHMS BIOINFO		2	3	7				7,5	x	-	-	o	-	
2h	TTK4160	MEDICAL IMAGING		4	4	4				7,5	x	-	-	-	o	
2h	TTK4705	MED CYBERNETICS SPEC				36				22,5	x	v	-	-	-	
2h	TTT4725	MED SIGN PROC SPEC				36				22,5	x	v	-	-	-	
2h	TDT4700	HEALTCARE INFO SPEC				36				22,5	x	-	o	-	-	
2h	TDT4755	BIOINFORMATICS SPEC				36				22,5	x	-	-	o	-	
2h	TFY4700	BIOPHYSICS SPEC				36				22,5	x	-	-	-	o	
		Master thesis														
2v	TTK4900	ENGINEERING CYBERN								30,0		v	-	-	-	
2v	TFE4900	SIGN PROC COMMUN								30,0		v	-	-	-	
2v	TDT4900	COMP INFORM SCIENCE								30,0		-	o	o	-	
2v	TFY4900	PHYSICS								30,0		-	-	-	o	

o - compulsory courses
v - optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Exam Spring

Specialization:
1. Medical Imaging
2. Healthcare Informatics
3. Bioinformatics
4. Biophysics and Medical Physics
5. Medical Biotechnology (*see separate Tabel on next page)

MASTER OG SCIENCE IN MEDICAL TECHNOLOGY, SPECIALISING IN MEDICAL BIOTECHNOLOGY

Specialising in medical biotechnology will give broad competence in biochemistry, microbiology and molecular genetics, with emphasis on molecular biology. Students will acquire skills in planning and performing biotechnological experiments involving recombinant DNA techniques, manipulation of suitable model systems for production of recombinant proteins, as well as performing functional analyses on these products.

Admission
Admissions and course organisation are decided by the NT Faculty, based on recommendations from the Department of Biology and the Department of Biotechnology. Prospective students should have a Bachelor Degree in Cell and Molecular Biology, or background corresponding to 3 year university studies in biotechnology with emphasis on molecular biology.

Courses and programme structure, Medical Biotechnology

2. Yr	4. Term	Master project (30 credtis)			
	3. Term	Specialisation Topic	Specialisation Project (15 credits)		BI3016 Mol Cell Biol
1. Yr	2. Term	Experts in Team	MOL3013 Mol. Physiol	BI2014 Mol. Biol.	Elective 3
	1. Term	MOL3000 Mol. Medicine	TBT4145 Mol. Genetics	Elective 1	Elective 2

Compulsory subjects

MOL3000	Molecular medicine
TBT4145	Molecular genetics
--	Experts in Team
BI2014	Molecular Biology
MOL3013	Molecular Physiology
BI3016	Molecular Cell Biology

Elective subjects 1st term

TBT4135	Biopolymers
FI3107	Biotechnology and ethics
BI3013	Experimental cell biology

Elective subjects 2nd term

MOL8002	Molecular mechanisms of host defence
BI3018	Patenting and commercialisation

Specialisation Topics 3rd term
TBT4700 Biotechnology, Specialisation (if 3.75 credits each, choose two):
- TBT7 Bioinformatics (3.75 credits)
- TBT4 Biopolymer materials (3.75 credits)
- TBT5 Metabolic engineering (3.75 credits)
- TFY5 Physiology (3.75 credits)
- Automation/ instrumentation (MOL3012, 7.5 credits)
- Receptor signalling and trafficing (MOL 8006, 7.5 credits)

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN PETROLEUM ENGINEERING AND PETROLEUM GEOSCIENCES

Term 1, 2, 3 and 4

PETROLEUM ENGINEERING (MSG1)

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Specialization 1	2	3	4
1h	TPG4145	RESERVOIR FLUIDS		4	6	2				7,5	x	o	o	v	v
1h	TPG4150	RESERVOIR REC TECHN		4	4	4				7,5	x	o	o	o	o
1h	TPG4177	CARB RESERVOIR CHAR		4	2	6				7,5	x	v	v	v	v
1h	TPG4215	HIGH DEV DRILLING		4	1	7				7,5	x	v	v	o	v
1h	TPG4235	WELL TESTING AC		3	1	8				7,5	x	v	v	v	v
1h	TPG5100	MATH/COMPUTER METHOD		2	8	2				7,5	-	o	o	o	o
1h	TPG5120	PETROPHYSICS BC	1	4	2	6				7,5	x	v	v	v	v
1v	TPG4160	RESERVOIR SIMULATION					4	4	4	7,5	x	o	v	v	v
1v	TPG4180	PETR PHYS INTERPR AC	1				4	2	6	7,5	x	v	v	v	o
1v	TPG4205	DRILL TECH PR CONTR					2	2	8	7,5	x	v	v	v	v
1v	TPG4220	DRILLING FLUID/HYDR					2	2	8	7,5	x	v	v	o	v
1v	TPG4225	FRACTURED RESERVOIR					3	2	7	7,5	x	v	v	v	v
1v	TPG4230	FIELD DEVELOPMENT					3	2	7	7,5	x	o	o	o	o
1v	TPG5110	PETROLEUM ECONOMICS					3	2	7	7,5	x	v	v	v	v
		Compulsory and optional subjects	2												
2h	TPG4185	FORMATION MECHANICS		3	3	6				7,5	x	v	v	v	v
2h	TPG4700	FORM EV-ENG SPEC				36				22,5	x	-	-	-	o
2h	TPG4705	PETR PROD SPEC				36				22,5	x	-	o	-	-
2h	TPG4710	DRILLING SPEC				36				22,5	x	-	-	o	-
2h	TPG4715	RESERVOIR ENG SPEC				36				22,5	x	o	-	-	-
2h	TPG5200	PET ENG/GEO INT PROJ			5	7				7,5	-	v	v	v	v
		Compulsory and optional subjects	3												
		Master Thesis													
2v	TPG4920	PETROL ENGINEERING								30,0					

o - compulsory subjects
v - optional subjects

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) TPG4180 requires TPG5120 or equivalent.
2) Two optional subjects must be chosen in the autumn semester (1h) in specialization 4. In specialization 1, 2 and 3 one optional subject must be chosen. Three optional subjects must be chosen in the spring semester (1v) in specialization 2. Two subjects must be chosen in specialization 1, 3 and 4.
3) One subject must be chosen in the third semeser (2h). In addition to the subjects listed, students can also choose from first semester, Petroleum Engineering, Petroleum Geosciences ad Phd-courses if taught in English.

Specialization:
1. Reservoir Engineering
2. Petroleum Production
3. Drilling Engineering
4. Formation Evaluation

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN PETROLEUM ENGINEERING AND PETROLEUM GEOSCIENCES

Term 1, 2, 3 and 4

PETROLEUM GEOSCIENCES (MSG2)

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
1h	TGB4160	PETROLEUM GEOLOGY		3	2	7				7,5	x
1h	TPG4125	SEISMIC WAVE PROP		4	2	6				7,5	x
1h	TPG4150	RESERVOIR REC TECHN		4	4	4				7,5	x
1h	TPG4177	CARB RESERVOIR CHAR		4	2	6				7,5	x
1h	TPG4185	FORMATION MECHANICS		3	3	6				7,5	x
1h	TPG4195	GRAVIMETR MAGNETOMET		4	1	7				7,5	x
1h	TPG5100	MATH/COMPUTER METHOD		2	8	2				7,5	-
1h	TPG5120	PETROPHYSICS BC	1	4	2	6				7,5	x
1v	TGB4135	BASIN ANALYSIS					2	3	7	7,5	x
1v	TGB4170	DIAGENESIS/RES QUAL					2	2	8	7,5	x
1v	TPG4120	ENG/ENVIRONM GEOPHYS					2	2	8	7,5	x
1v	TPG4130	SEISMIC INTERPRET					2	3	7	7,5	x
1v	TPG4170	RESERVOIR SEISMICS					4	1	7	7,5	x
1v	TPG4180	PETR PHYS INTERPR AC	1				4	2	6	7,5	x
1v	TPG5110	PETROLEUM ECONOMICS					3	2	7	7,5	x
		Compulsory and optional subjects	2								
2h	TGB4715	PETR GEOLOGY SPEC				36				22,5	x
2h	TPG4190	SEISMIC DATA		3	2	7				7,5	x
2h	TPG4720	PETR GEOPHYS SPEC				36				22,5	x
2h	TPG5200	PET ENG/GEO INT PROJ			5	7				7,5	-
		Compulsory and optional subjects	3								
		Master Thesis									
2v	TGB4915	PETROLEUM GEOSCIENCE								30,0	
2v	TPG4925	PETROLEUM GEOSCIENCE								30,0	

o - compulsory subjects
v - optional subjects

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) TPG4180 requires TPG5120 or equivalent.
2) In the autumn semester (1h) TPG4125 and TPG5100 is compulsory. In the spring semester (1v) TPG4130 is compulsory. Totally four subjects must be chosen each semester, see note 3.
3) In addition to the subjects (listed 2h), students can choose from 1h Petroleum Engineering, 1h Petroleum Geosciences and Phd-courses if taught in English.

FACULTY OF SOCIAL SCIENCES AND TECHNOLOGY MANAGEMENT

MSC-PROGRAMME IN PROJECT MANAGEMENT
(MSPROMAN)

Term 1, 2, 3 and 4

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Comp/ Opt.
1h	TBA5200	PROJECT MANAGEMENT 2		3	2	7				7,5	x	o
1h	TIØ5200	PROJECT MANAGEMENT 3		3	2	7				7,5	x	o
1h	TPK5100	PROJ MANAGEMENT 1		2	2	8				7,5	x	o
1h	TPK5110	QUALITY/RISK MANAGEM		2	3	7				7,5	x	o
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	o
1v	TIØ5210	PROJECT MANAGEMENT 5					3	2	7	7,5	x	o
1v	TIØ5215	PROJECT MANAGEMENT 6					3	2	7	7,5	x	o
1v	-	ELECTIVE	1							7,5		v
2h	TIØ5220	PRO MAN SPEC				36				22,5	x	o
2h	TIØ4265	STRATEGIC MGMT	2	3	2	7				7,5	x	v
		Master Thesis										
2v	TIØ4920	PROJ MANAGEMENT								30,0		

o - compulsory courses
v - optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Theses Spring

1) A technical or project-related course must be chosen.
2) Students can apply for a technical course instead of this course.

FACULTY OF ENGINEERING SCIENCE AND TECHNOLOGY

MSC-PROGRAMME IN RELIABILITY, AVAILABILITY, MAINTAINABILITY AND SAFETY (MSRAMS)

Term 1 and 2 (Autumn 2006 and Spring 2007)
Term 3 and 4 (Autumn 2007 and Spring 2008)

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam	Comp/ Opt.
1h	TPK4120	SAFETY/RELIABIL ENG		3	2	7				7,5	x	o
1h	TPK5100	PROJECT MANAGEMENT 1		3	2	7				7,5	x	o
1h	TPK5155	MAIN OP/MANAGEMENT		3	2	7				7,5	x	o
1h	TPK5160	RISK ANALYSIS		3	2	7				7,5	x	o
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-	o
1v	TIØ4205	SHE-METH/TOOLS SHE	1				4	1	7	7,5	x	v
1v	TMA4255	DESIGN EXP/STAT MET	1				4	1	7	7,5	x	v
1v	TMA4275	LIFETIME ANALYSIS	2				4	1	7	7,5	x	v
1v	TMR4130	RISK/SAFE MAR TRANSP	2				2	8	2	7,5	-	v
1v	TPK5165	RAMS ENG/MANAGEMENT					3	2	7	7,5	x	o
2h	TPK5110	QUALITY/RISK MANAGEM		2	3	7				7,5	x	o
2h	TPK5150	RAMS OPTIMIZATION		3	2	7				7,5	x	o
2h	-	PROJECT WORK				24				15,0	-	o
2v		Master Thesis								30,0		

o - compulsory courses
v - optional courses

Ex 1h = Term 1, Exam Autumn
Ex 1v = Term 2, Exam Spring
Ex 2h = Term 3, Exam Autumn
Ex 2v = Term 4, Master Thesis Spring

1) Select 1 of the courses.
2) Select 1 of the courses.

COURSES DESCRIPTION OF THE MASTER OF SCIENCE DEGREES IN ENGINEERING

Department of Civil and Transport Engineering

TBA4110 Soil Investigations

Lecturer: Professor II Corneliu Athanasiu, Professor Steinar Nordal
Coordinator: Professor Steinar Nordal
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Project work

Learning objectives: The course shall provide a comprehensive knowledge of the mechanical properties of soils, both concerning the theoretical background, as well as field and laboratory methods for determination and interpretation of the soil parameters.
Recommended previous knowledge: The course is based on TBA4100 Geotechnics and geology and TBA4105 Geotechnics, Calculation Methods.
Academic content: Need for site characterisation and determination of material properties, field investigations including soundings, sampling and in situ tests, laboratory tests including index testing, tests for determination of stiffness and strength, special laboratory tests and model tests. Planning of site investigation, presentation and evaluation of test results. Short introduction to input parameters for use in finite element analyses.
Teaching methods and activities: The course is based on lectures, practical exercises in the field and laboratory as a part of a site investigation project. Colloquiums with presentation and discussion of test data. The practical exercises and project work are carried out as group work with 2 - 3 students per group. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes are provided from the division.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	50/100	D
EXCERCISES			50/100	

TBA4115 Finite Elements in Geotechnical Engineering

Lecturer: Professor II Corneliu Athanasiu, Professor Steinar Nordal
Coordinator: Professor Steinar Nordal
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Pass/Fail Compulsory assignments: Assignments

Learning objectives: The course shall give background knowledge, competence and practical skills in computational geotechnics. As an example, the course will show how we may simulate and visualize an excavation process step by step. We may start with a flat terrain, install a sheet pile wall, excavate, install soil anchors, continue excavation, make the foundations and refill. The on screen visualizations will be used to gain improved geotechnical insight.
Recommended previous knowledge: The course is based on TBA4100 Geotechnical Engineering and Engineering Geology, TBA4105 Geotechnics, design methods and TBA 4110 Soil investigations.
Lectures in english.
Academic content: The course gives a basis for practical use of the Finite Element Method in geotechnical design. The theoretical background of the method is briefly covered. Focus is primarily on basic understanding of soil behavior, problem definition, determination of input soil parameters, evaluation of computed results and comparison to hand calculated estimates. The numerical analyses will cover bearing capacity and settlement of simple and complex foundations, slope stability, retaining structures and buried pipelines. Seepage of water and consolidation with time are dealt with. The lectures are closely related to the exercises.
Teaching methods and activities: The course consists of a combination of conventional lectures and "hands on" exercises using the computer program PLAXIS. The exercises shall normally be made in groups, with two students in each group. Computed results will be discussed in class. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes from Geotechnical Division, NTNU.
Assessment: Written/Exercises/Midterm Examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.06.2007	09.00	50/100	C
MIDTERM EXAMINATION			30/100	C
EXCERCISES			20/100	

TBA4145 Port and Coastal Facilities

Lecturer: Professor II Svein A Fjeld
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To provide applicable knowledge and background for planning, design, construction and operation of marine facilities with focus on concepts and principles involved.
Recommended previous knowledge: TBA4265 Marine Physical Environment and Calculation methods in geotechnical engineering or similar.
Academic content: Guidelines and principles in marine civil engineering. Approach navigation channels, ports and harbours. Terminal facilities. Marine structures in port and coastal engineering; quays, including moorings and fenders, breakwaters, coastal defence works etc. Dredging, handling and deposition of clean and polluted materials.
Teaching methods and activities: Lectures, laborative demonstrations and exercises.The subject is integrated in the MSC program Coastal and Marine Civil Engineering and is taught in English. The midterm examination will only count in a positive direction. If the
result of the midterm examination is poorer than the result in the written examination, the final grade will be based on the weighted sum of the written examination (80%) and the midterm examination (20%). If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Textbook, lecture notes and selected papers.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	80/100	C
MIDTERM EXAMINATION			20/100	D

TBA4265 Marine Physical Environment

Lecturer: Førsteamanuensis Øivind Asgeir Arntsen, Professor Sveinung Løset
Coordinator: Professor Sveinung Løset
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises and laboratory demonstrations

Learning objectives: Knowledge and skills dealing with action and action effects from environmental processes as wind, currents, waves and ice in a marine environment.
Recommended previous knowledge: Basic course in Fluid mechanics and in Statistics. B.Sc in Civil Engineering or similar.
Academic content: Marine physical processes. Description of waves, currents, wind and formation and mechanics of ice. Resulting consequences for marine activities. Fundamentals of statistical methods used in physical marine environment. Special note: For students from developing countries, the ice topics are replaced by topics of particular interest for these students.
Teaching methods and activities: Lectures, laboratory demonstrations and exercises and laboratory exercises. The subject is integrated in the MSC program Coastal and Marine Civil Engineering and is taught in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Information at start of term. Textbook and lecture notes.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.12.2006	09.00	80/100	C
MIDTERM EXAMINATION			20/100	D

TBA4270 Coastal Engineering

Lecturer: Førsteamanuensis Øivind Asgeir Arntsen, Professor Eivind Bratteland
Coordinator: Førsteamanuensis Øivind Asgeir Arntsen
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises and laboratory demonstrations

Learning objectives: To give the student a good background for planning and working in the coastal zone, with emphasis on waves towards the coast, sand transport, erosion and scour.
Recommended previous knowledge: TBA4265 Marine Physical Environment or similar.
Academic content: Use of the coastal zone, planning, environment, rules and guidelines. Description of the coastal zone physical environment; wave transformation, currents, wind, sand transport, erosion and accretion, scour and scour protection.
Teaching methods and activities: Lectures, laboratory demonstrations and exercises.
The subject is integrated in the MSC program Coastal and Marine Civil Engineering and is taught in English. The midterm examination will only count in a positive direction. If the result of the midterm examination is poorer than the result in the

written examination, the final grade will be based on the weighted sum of the written examination (80%) and the midterm examination (20%). If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Compendium, selected papers.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.06.2007	09.00	80/100	C
MIDTERM EXAMINATION			20/100	D

TBA4275 Dynamic Response to Irregular Loadings

Lecturer: Førsteamanuensis Øivind Asgeir Arntsen, Professor Geir Moe
Coordinator: Professor Geir Moe
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Familiarize the students with modern methods for description of environmental loading and the resulting response, e.g. structural displacements.
Recommended previous knowledge: The subject is partly based on TBA4265 Marine Physical Environment and TKT4201 Structural Dynamics or equivalent.
Academic content: Natural phenomena such as water waves, wind and earthquakes will be modelled as irregular time series, and these are considered as input to systems that have the corresponding forces as output. On the next level these forces are input in a system in which the displacements of a structure is the output. The relationship from input to output is denoted 'transfer function', and from this follows the response spectrum. Further average frequency, average number of peaks of different magnitude, per time unit, and expected maximum response may be determined.
Teaching methods and activities: Lectures and exercises. The subject is integrated in the MSC program Coastal and Marine Civil Engineering and is taught in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Textbook, compendium, papers.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2007	09.00	80/100	D
MIDTERM EXAMINATION			20/100	D

TBA4305 Transport Systems

Lecturer: Professor Tore Øivin Sager
Weekly hours: Autumn: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To provide knowledge and understanding of the freight transport systems and developments and the related logistics in the integrated transport chain.
Recommended previous knowledge: None.
Academic content: Infrastructure and markets for all freight transport modes are characterized from the perspectives of logistics and transport economics. Key elements are market development, transport policy, competitive interfaces, organization, and the needs and strategies of the actors responsible for commercial transport functions. Terminals and special features of road, rail, sea, and air transport systems as part of the general logistics and supply chain are considered. Cost-benefit analysis and other methods of transport economics are introduced.
Teaching methods and activities: Lectures, seminars, and exercises. The course is lectured in English. Exercises and final test can be answered in Norwegian. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Textbook, lecture notes, and selected papers.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	09.00	70/100	C
EXCERCISES			30/100	

TBA4700 Geotechnical Engineering, Specialization

Lecturer: Professor II Corneliu Athanasiu, Amanuensis Arnfinn Emdal, Professor Lars Olav Grande, Professor Steinar Nordal, Førsteamanuensis Rolf Birger Sandven
Coordinator: Amanuensis Arnfinn Emdal
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The purpose with this course is to provide the students with some general orientation to the field of geotechnical engineering and a more narrow specialization on specific topics. The student shall also train in planning the execution of projects on her own, in oral and written presentation and in organizing information in a systematic fashion.
Recommended previous knowledge: The course consists of a project work (11.5 ECTs) and 3 themes (3.75 ECTs each). The course build on TBA4100 Geotechnical Engineering and Engineering Geology, TBA4105 Geotechnics, Design Methods, TBA4110 Soil Investigations and TBA4115 Finite Elements in Geotechnical Engineering. Additional prerequisits depends on the theme for the project work and will be settled with the lecturer.
Academic content: The project work may either be of research nature or it may be organized as Geotechnical Design Task. Themes may be chosen from Geotechnical Engineering or from other areas. Topics can be: Foundation Engineering and Constructions, Elastoplasticity of soils, Advanced field- and laboratory testing, Environmental soil mechanics, Marine geotechnical engineering, Snow avalanches and rock falls.
Teaching methods and activities: Project works performed individually or in groups lead by lecturer appointed by the Department.
Course materials: Handouts from the Geotechnical Group.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	50/100	D
EXCERCISES			50/100	

TBA4730 Coastal and Marine Civil Engineering, Specialization

Lecturer: Førsteamanuensis Øivind Asgeir Arntsen, Professor Eivind Bratteland, Professor Sveinung Løset, Professor Geir Moe
Coordinator: Professor Eivind Bratteland
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The project will give the student an in-depth knowledge and competence within a selected area of the field. The project will improve the ability to do independent engineering/research work, and provide training in planning of projects, systematic processing of information and report writing.
Recommended previous knowledge: Passed exams in the required subjects for the project work and chosen theory subjects.
Academic content: The specialisation project represents 11.25 ECTS credits. It should include problems related to research and development within the chosen subject areas. Whenever possible the project should be linked to local problems and challenges and preferably have a local supervisor for the project. The project may comprise theoretical, numerical, empirical, experimental or field studies. If possible, fieldwork should be included. The specialisation project will normally be a starting point for the thesis work in the spring term. The student can work individually or in a team. In addition there is a theory part consisting on normally three theory subjects. These together with the project work constitutes the spesialization. Offered theory subjects are:
Coastal Engineering II (Associate professor Øivind Arntsen)
Port Engineering (Professor Eivind Bratteland)
Flow-induced vibrations (Professor Geir Moe)
Structures in ice-infested areas (Professor Sveinung Løset)
Special subject Marine Civil Engineering (Professor in charge)
In Arctic Offshore Engineering subjects given at UNIS can be chosen (Professor in charge)
Theory subjects offered by others may be chosen provided approval by professor in charge.
Teaching methods and activities: Supervised project work. The teaching method for the theory subjects will depend of the number of students attending. It could be lectures, colloquiums, seminares or self study. The evaluation is based on the project report and itsd oral presentation (50%) and on an oral examination of the theory subjects (50%). The theory subjects can be taught in English as they are integrated in the MSc Programme in Coastal and Marine Civil Engineering.
Course materials: Will be stated at the beginneing of the term and depends on the project type.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	50/100	D
EXCERCISES			50/100	

TBA5100 Theoretical Soil Mechanics

Lecturer: Professor Lars Olav Grand, Amanuensis Arnfinn Emdal
Coordinator: Professor Lars Olav Grande
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments

Learning objectives: The course is designed to give thorough theoretical background for the geotechnical design methods for slope stability, earth pressure, bearing capacity of foundations and piles as well as assessments of settlements and displacements.
Recommended previous knowledge: B.Sc degree in Civil Engineering or equivalent. Basic courses in geology and geotechnics.
Academic content: Theoretical background for the calculation methods used in geotechnical engineering. Relevant stress fields based on the theory of plasticity, basic elements and combinations. Principles and recipes for performing short-hand calculations of settlements, slope stability, earth pressure and bearning capacity of foundations and piles. The course aims at creating understanding through classical analysing tools and hand calculations as well as demonstrations of real design cases.
Teaching methods and activities: Lectures, calculation and laboratory exercises. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Information at start of term, lecture notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	12.12.2006	09.00	100/100	D

TBA5150 Geohazards and Risk Analysis

Lecturer: Professor II Farrokh Nadim
Weekly hours: Autumn: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments

Learning objectives: Soils and rocks are among the most variable of all engineering materials, and as such they are highly amenable to a probabilistic treatment. The main objective of the course is to present a state-of-the-art training on probabilistic techniques applied to geotechnical engineering in relation to both theory and practice. Special emphasis will be on problems related to geohazards, e.g. earthquakes and landslides.
Recommended previous knowledge: BSc degree in Civil Engineering or equivalent. Basic courses in geology and geotechnics. Introductory understanding of probability and statistics.
Academic content: The course will include: (a) terminology used in risk assessment, (b) discussion of the sources and types of uncertainties in problems related to geohazards, (c) discussion of the potential benefits of a probabilistic approach as opposed to the classical "Factor Of Safety" method in geotechnical analysis, (d) review relevant statistical and probabilistic theories needed to develop the methodologies and to interprete the results of the probabilistic analyses, and (e) describe some well established methods of probabilistic analysis as applied to geotechnical analysis, such as First Order Second Moment (FOSM) method and the First Order Reliability Method (FORM), event tree and logic tree construction, reliability of "systems".
Teaching methods and activities: Lecture, term project, assignments.
Course materials: Lecture notes presented by the geotechnical division.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2006	09.00	50/100	D
EXCERCISES			50/100	

TBA5155 Landslides and Slope Stability

Lecturer: Professor Lars Olav Grande
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: This course will be focusing on the stability of natural slopes and stability considerations related to manmade cuts or fills. Focus will be on the conditions up until a slide is initiated, leaving out the post-failure description and modelling of mass transport.
Recommended previous knowledge: BSc in Civil Engineering or equivalent. The course is based on TBA4100 Geotechnical Engineering and Engineering Geology and TBA5100 Theoretical soil mechanics and TBA4110 Soil Investigations or equivalent.
Academic content: Theory and principles of slope stability evaluation will be covered in detail, ranging from simple methods for hand calculations to finite element simulations. Factors influencing stability will be studied. A thorough presentation of international case records will be included. An introduction to submarine slides, effect of earthquakes and non-saturated soil will be given. Both deterministic and probabilistic approach will be covered.
Teaching methods and activities: Lectures, project work with practical field and laboratory exercises. Calculation by hand and by use of FEM-code PLAXIS. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes from the geotechnical division.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	100/100	D

TBA5200 Project Management 2 - Front End Planning and Control

Lecturer: Førsteamanuensis Kjell Austeng
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Semester paper

Learning objectives: To understand the project context and the constraints regarding to the factors for success or failure. How to develop the project from need and objectives to concept and real plans, and how to manage the performance including contracts, change and risk.
Recommended previous knowledge: Project Planning and Control 1 or similar.
Academic content: Project success and failure, project context and stakeholders, assessment of needs, objectives and effects, risks and opportunities, project mandate and basic design, estimating costs and revenues, contractual aspects, health and safety mainstreaming, strategic and tactical management, project performance management and evaluation, flexibility and change, project close-out.
Teaching methods and activities: One written assignment. (Group work). Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and assignment/exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: To be announced.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	50/100	A
EXCERCISES			50/100	

Department of Computer and Information Science

TDT4210 Healthcare Informatics

Lecturer: Førsteamanuensis Øystein Nytrø
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To give insight in, and understanding of the particular requirements to information systems, and information- and knowledge management, in the health services.
Recommended previous knowledge: Some knowledge about medicine and healthcare. Basic informatics competence, including software engineering, information systems and modelling.
Academic content: The health services sector is very information- and knowledge intensive. In addition, it is exceptionally large, complex and dynamic. The computerized patient record is an important clinical tool, and its content, structure and usage is discussed i depth. Further themes are coding, record standards, plans, requirements and legal issues, functionality, usability, computer-supported cooperation, decision support and guidelines.
Teaching methods and activities: Lectures, programming laboratory, projects, theoretical assignments. The final grade will be the result of a 'port-folio' evaluation, where the final exam will have 70% weight and other work 30%. The parts will be graded on a 0 - 100 points scale, the weighted result will be on the usal A - F scale. Postponed/repeated exams may be oral.
Course materials: Textbook, articles, lecture notes and other material.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	70/100	D
EXCERCISES			30/100	

TDT4213 Clinical Information Systems

Lecturer: Førsteamanuensis Øystein Nytrø
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Project, laboratory

Learning objectives: Detailed knowledge about standards, non-standards and ongoing standardization efforts. Theoretical knowledge, and practical experience, in using and adapting various methods and theories. Practical experience with selected clinical situations and systems.
Recommended previous knowledge: Bachelor degree in informatics or similar. TDT4210 Healthcare informatics or similar. MFEL1010 Medicine for non-medicine students or similar.
Academic content: The course will give knowledge and practical experience with methods and theory for developing clinical information-, knowledge- and cooperation systems.
Examples and laboratory work will as far as possible be related to ongoing national or international research or development

projects. Particular topics are: National and international standards for storage and exchange of information and knowledge. Architecture of heterogeneous and distributed systems. Methods for observation, development, evaluation and analysis of information and communication processes and information use in healthcare services. Encoding and representation of clinical knowledge and information.
Teaching methods and activities: Lectures and programming laboratory. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Research papers and reports
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.06.2007	15.00	70/100	D
EXCERCISES			30/100	

TDT4215 Knowledge in Document Collections

Lecturer: Professor Jon Atle Gulla
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The students will understand how textual document collections are used in organizations and what role they are given in the management of organizational knowledge. They should know the techniques for document retrieval and knowledge discovery in large document collections. There is an overview of how documents may be analysed semantically with respect to categorization, concept extraction, and knowledge management. Some specific problems associated with documents and services on the web will also be discussed.
Recommended previous knowledge: Course TDT4175 Information Systems, or equivalent
Academic content: Information retrieval in textual document collections. Search engines. Linguistic and statistical techniques for text mining. Text categorization on the basis of semantic content. Concept extraction. Ontologies in knowledge management. Semantic web. Web service management.
Teaching methods and activities: Lectures and exercises. The course may be taught in English if taken by students without Norwegian language skills. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written test (60%) and exercises (40%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. In case of delayed exam (continuation exam) the final written test may be replaced by an oral test.
The course may be taught in English if taken by students without knowledge of Norwegian.
Course materials: Announced at start of semester.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2006	09.00	60/100	D
EXCERCISES			40/100	

TDT4220 Computer Systems Performance Evaluation

Lecturer: Professor Peter Henry Hughes
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course provides an introduction to quantitative methods for the design, sizing and analysis of computer systems. In the exercises, students learn how to apply these methods with the help of generic examples.
Recommended previous knowledge: Knowledge of Computer science and Statistics corresponding to the first five semesters of the Masters programme in Computer Science.
Academic content: An introduction to quantitative methods for the design, sizing and analysis of computer systems. This will include: basic concepts; measurement techniques; workload characterisation; static and dynamic models; elementary queuing networks and discrete-event simulation.Applications will address performance requirements during both system development and operation
Teaching methods and activities: Lectures and exercises. Students take an obligatory mid-term test which gives feedback on progress. The course can be given in English if it is taken by students without sufficient knowledge of Norwegian. The final character is based on a portfolio evaluation. Grades for the separate parts are given in percentage points whereas the overall grade is given as a character.
In the event of postponement or re-sit (so-called 'kontinuasjonseksamen') the written examination can be changed to an oral examination.
Course materials: Provided at the start of the semester.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	15.00	75/100	C
EXCERCISES			25/100	

TDT4230 Visualization

Lecturer: Amanuensis Torbjørn Hallgren
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give the students knowledge of and skills in the methods and techniques of modern computer graphics as a basis for visualization in a broad sense.
Recommended previous knowledge: Course TDT4195 Image Techniques or equivalent.
Academic content: Representing curves and surfaces. Geometric modeling. Visible surfaces detection methods. Illumination and reflection models. Interactive methods in computer graphics. Colour theory and applications in raster graphics. Hierarchical modeling. Computer animation. Virtual reality. Volume visualization. Graphics file formats. Technical and scientific visualization.
Teaching methods and activities: Lectures and exercises. Excursions. The finale grade is to be based on "mappevurdering". In the final grade a test during the semester counts for 30/100 and the final examination counts for 70/100. The results from each of the parts are given as points of maximum 100. The final result is given as a normal grade by the letters A through F. Postponed/repeated exams may be oral.
Course materials: To be announced at start of semester.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	15.00	70/100	D
EXCERCISES			30/100	

TDT4240 Software Architecture

Lecturer: Professor Maria Letizia Jaccheri, Førsteamanuensis Alf Inge Wang
Coordinator: Førsteamanuensis Alf Inge Wang
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give the students understanding of the concept of software architecture and how this phase in the development between requirement specification and detailed design plays a central role for the success of a software system. The students will get knowledge of some well-known architectures and be able to construct and evaluate architectures for software systems. In addition, the students should get some understanding of how the developers experiences and the technical and organisational environment will influence on the choice of architecture.
Recommended previous knowledge: TDT4140 Software Engineering, or equivalent
Academic content: Architectural styles and patterns, methods for constructing and evaluating architectures, and comnponent-based development. Design patterns and object-oriented frameworks.
Teaching methods and activities: Lectures and exercises. Portfolio evaluation is the basis for the grade in the course. The portfolio includes a final written test (70%) and exercises (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. If there is a repitition of an examination, the final exam can be changed to oral.
Course materials: To be announced at the start of the term.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.05.2007	09.00	70/100	C
EXCERCISES			30/100	

TDT4245 Cooperation Technology

Lecturer: Professor Monica Divitini
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course aims at giving students a basic knowledge of computer supported cooperative work (CSCW). This knowledge should allow students to compare and choose different solutions for supporting cooperative work as well as design new technologies.
Recommended previous knowledge: TDT4140 Systemutvikling, or contact the teacher.
Academic content: Computer supported cooperative Work (CSCW), coordination, shared workspaces, cooperation support for nomadic users, design and evaluation of cooperative technologies.
Teaching methods and activities: Lectures and exercises. The course will be taught in English if there are students that do not speak Norwegian. For the continuation exam, the written exam can be substituted with an oral exam.
Course materials: Compendium available at course start

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	20.12.2006	09.00	100/100	D

TDT4250 Information Systems Modelling

Lecturer: Professor John Krogstie, Førsteamanuensis Hallvard Trætteberg
Coordinator: Professor John Krogstie
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students shall have theoretical insights into different languages and techniques for making models of information systems, as well as practical skills in making good models, evaluating the quality of models, and selecting a suitable modelling language based on the context.
Recommended previous knowledge: Course TDT4175 Information Systems, or equivalent.
Academic content: The role of modelling in information systems development and use. Various perspectives for modelling languages (information, function, object, rule, agent, behaviour, speech act), with examples of languages of different perspectives and a discussion of usage, strengths, and weaknesses. Quality evaluations of models and languages, and techniques (e.g., possible tool support) to achieve various types of quality. Methods related to modelling and quality assurance of models.
Teaching methods and activities: Lectures and exercises. The course may be taught in English if taken by students without Norwegian language skills.
Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written test (70%) and exercises (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. In case of delayed exam (continuation exam) the final written test may be replaced by an oral test.
Course materials: To be announced at the start of the term.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.12.2006	09.00	70/100	C
EXCERCISES			30/100	

TDT4280 Distributed Artificial Intelligence and Intelligent Agents

Lecturer: Førsteamanuensis Pinar Øzturk
Weekly hours: Spring: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To be able to describe the main principles of distributed AI and the use of techniques from AI in distributed environments. To define the notion of intelligent agenter (IA) and to explain the main characteristics of IAs. To classify different types of IA architectures and their 'components' (i.e., reactive, deliberative, social components), and the relations between these components. To describe the propoerties of different types of agent environments and to be able to decide what kind of agent architecture is most suitable in each type of environment. To analyse and discuss differences and similarities, and advantages and disadvantages of different types of agents. To explain different types of interactions in multiagents systems. To be able to use different types of interaction strategies. To be able to analyse and determine which type of interaction is needed in a given multiagent environment. To describe the structure of an agent language, and to compare existing languages. Be able to use the agent languages in various agentinteraction settings.
Recommended previous knowledge: TDT4170 Knowledge Based Sysems or IT2702 Artificial Intelligene, or equivalent.
Academic content: The course gives an overview of the main aspects of distributed artificial intelligence, as for instance knowledge sharing, models of communication and cooperation in multi-agent systems, architecture for multi-agent systems. Central to the course is the term "intelligent agents" - its features and various possible architectures.
A practical part of the course is assignments/projects involving implementation of various aspecs of multi-agent systems.
Teaching methods and activities: Lectures and exercises. Portfolio evaluation is the basis for the grade in the course. The portfolio includes a final written exam (80%) and exercises (20%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Textbook: Wooldridge, M.J.: An Introduction to Multiagent Systems.
A set of papers: Will be announced at semester start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	25.05.2007	09.00	80/100	D
EXCERCISES			20/100	

TDT4287 Algorithms for Bioinformatics

Lecturer: Førsteamanuensis Magnus Lie Hetland
Weekly hours: Autumn: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The student should be able to use, and to some extent modify, known methods in order to solve bioinformatic problems. Some emphasis will also be put on individual and creative use of general algorithmic methods.
Recommended previous knowledge: The course TDT4120 Algorithms and Datastructures.
Academic content: The course deals with algorithmic methods with applications in bioinformatics, with a particular focus on string processing.
Teaching methods and activities: Lectures and exercises. If few students take the course, the lectures may be replaced with study groups. Postponed/repeated exams may be oral.
Course materials: Dan Gusfield, "Algorithms on Strings, Trees, and Sequences : Computer Science and Computational Biology" (Cambridge University Press, 1997)
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	D

TDT4290 Customer Driven Project

Lecturer: Professor Reidar Conradi, Professor Jon Atle Gulla
Coordinator: Professor Jon Atle Gulla
Weekly hours: Autumn: 2Ø+22S = 15.0 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give the students practical experience in executing all phases of large IS/IT projects
Recommended previous knowledge: Accepted to the 4th year of the computer science program.
Academic content: Each group is given a task from a client that is to be carried out as a project. All phases of IS/IT projects are to be covered: Preliminary studies, requirements specification, design, implementation, and evaluation. The emphasis is on the early phases. It is important that the groups work in close collaboration with the client. The groups will hand in a project report and give a final presentation and demonstration of a runnable system to the client and the censor. The following days are obligatory: the starting day of the course which is on Tuesday in the semester's second week, the two days course in group dynamics given early in the semester, and the weekly supervision. A failure to meet on these days may prevent the student from completing the course.
Teaching methods and activities: The tasks are carried out as group work with groups of 5-7 persons. Each group has a client and internal supervisors. The groups have obligatory meetings with the supervisors every week. The course includes a series of lectures.
Course materials: Reports from previous years and lectures.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TDT4730 Information Systems, Specialization

Lecturer: Professor Jon Atle Gulla, Professor John Krogstie, Professor Guttorm Sindre, Dekan Arne Sølvberg, Førsteamanuensis Hallvard Trætteberg
Coordinator: Dekan Arne Sølvberg
Weekly hours: Autumn: 2F+2Ø+32S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Insights into a research related specialization topic within the field of information systems, based on a chosen project assignment. A first introduction to research and dissemination. Creative skills, practical skills in report writing and oral presentation.
Recommended previous knowledge: At least one of the courses TDT4215 Document management and text analysis and TDT4250 Modelling of information systems.
Academic content: The course consists of 7,5 study points of theory and 15 study points of project work. The project assignment is chosen among those offered by the teachers in the Group of Information Systems. In addition, students have to take two theory modules, whereof at least one must be among those offered by the Information Systems group. The choice of theory topics must be done in agreement with the main supervisor of the chosen project assignment.
Teaching methods and activities: Guided self study. The final grade is based on examination in one or two theory modules (1/3) and the project report (2/3). Delayed exam (contination) for theory modules will be held within the expiration of the exam period.

To the extent that there is organized teaching in the theory modules, this will be given in English if the module is taken by students without Norwegian skills.
Course materials: To be announced at the start of the term.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

IT2702 Artificial Intelligence (AI)

Lecturer: Professor Agnar Aamodt
Weekly hours: Autumn: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course gives a general introduction to the field of artificial intelligence (AI). This field aims to realise aspects of intelligent behaviour in computer systems, by developing, implementing, and testing qualitative models of complex phenomena. The basis for this study is within cognitive, biological, and mathematical theories and models, in addition to computational theories.
Recommended previous knowledge: IT1105 Algorithms and Data Structures and MA0301 Discrete Mathematics, or equivalent. Methods and techniques will to some extent be illustrated through programming examples in the language LISP. Although not required, it is recommended for students without prior knowledge of Lisp to follow the course IT2105 Functional programming in parallel.
Academic content: The course starts with an introduction to state space search, to distinguish exhaustive from heuristic search methods. It describes different languages for knowledge representation, and reasoning mechanisms for computational problem solving and learning. Representations in the form of predicate logic, rules, frames, and semantical networks are covered, and related to the three main types of reasoning - rule-based, model-based, and case-based reasoning. Central principles for modelling and reasoning are covered in connection with methods for knowledge acquisition and machine learning. Further, an overview of sub-symbolic methods based on neural networks and genetic algorithms is given. The course also covers architectures for integration of different reasoning methods, agent-based architectures, and architectures for interactive problem solving through human-computer interplay.
Teaching methods and activities: Lectures, self study, exercises.
Course materials: Text book: George F. Luger, Artificial intelligence; Structures and strategies for complex solving, 4th edition, Addison-Wesley, 2002.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	8/10	D
EXCERCISES			2/10	

IT2801 Information Retrieval

Lecturer: Førsteamanuensis Herindrasana Ramampiaro
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students will learn and understand the principle, techniques and methods behind information retrieval.
Recommended previous knowledge: IT1104 Programming Advanced Course and IT1607 Introduction to Databases
Academic content: The course concerns automatic document storage and retrieval. In this case, the term document includes sounds and images as well as text. With this course you will learn about file organising, query operations, document operations and knowledge-based textual and multimedia information retrieval.
Teaching methods and activities: Lectures and exercises. The exercises will count 30% of the total grade.
Course materials: To be announced at the start of the semester
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	24.05.2007	09.00	70/100	D
EXCERCISES			30/100	

IT3604 Organization and ICT

Lecturer: Professor Eric Monteiro
Weekly hours: Autumn: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The aim is to provide insight into the organisational aspects in and around systems design
Recommended previous knowledge: IT 2603 or similarly
Academic content: Organisational issues in and around systems design. The key challenge amounts to understand and improve the interaction of technological and social aspects around development and use. Both theoretical and empirical experiénces are covered. More specifically, perspectives on systems design, user participation, automation of work, cooperation and coordination.
Teaching methods and activities: Lectures, colloquium, self study and exercises
Course materials: Announced at beginning of term
Assessment: Written assignment

Forms of assessment	Date	Time	Percentage	Exam. support
ASSIGNMENT			1/1	

IT3706 Knowledge Representation and Modelling

Lecturer: Førsteamanuensis Pinar Øzturk
Weekly hours: Autumn: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To describe the notions of 'knowledge' and 'representation, and the explain the relationship between these. To describe the main requirements form a reresentation language. To analyse different types of representation paradigms, to explain advantages and disadvantages of each type, to choose the right type of language in a given problem. To discuss why representation is usefull and necessary, and
to discuss why a group of researches argues that representation is not needed. To be able to model the knowledge in a given domain, and decide which knowledge acquisition type is the best one in e given problem setting.
Academic content: Main characteristics of a knowledge representation language will be studied. Various KR paradigms will be compared with respect to these characteristics. The representation languages will be related to the underlying inference methohds, and syntactical, semantical, and pragmatical aspects of computational representations. Advantages and disadvantages of each paradigm will be analysed. Methods for knowlege analysis and modelling will be investigated. An introduction to ontology notion will be given.
Teaching methods and activities: Lectures, guided colloquia, self study, and exercises. Portfolio evaluation is the basis for the grade in the course. The portfolio includes a final oral exam (80%) and exercises (20%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade.
Course materials: Textbook and a set of papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	08.12.2006	09.00	8/10	
EXCERCISES			2/10	

Department of Energy and Process Engineering

TEP4220 Energy and Environmental Consequences

Lecturer: Professor Edgar Hertwich
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: This course aims to provide students with an understanding of the environmental consequences of energy systems, of quantitative impact assessment methods, and skills for building simple models for the purpose of environmental impact assessment.
Recommended previous knowledge: At least 30 studypoints (1 semester) of math, physics, chemistry or other quantitative courses.
Academic content: This course offers a thorough understanding of environmental issues, such as climate change or health and ecological effects of toxic emissions. It offers an introduction to methods for the evaluation of the environmental consequences of energy systems. Methods include human and ecological risk analysis and external cost analysis, including models used in these assessments. Students learn how to evaluate environmental stresses and human health consequences of energy technologies. The course covers the use of toxicological and epidemiological data in risk assessment, assessment of chemical fate and dexposure, and evaluation of climate change.
Teaching methods and activities: The lectures focus on knowledge of different types of environmental probelms and of methods to assess environmental impacts. Exercises aim at enabling the student to set up simple models to describe different processes ocurring in nature. The models consist of sets of equations and are solved on paper or with the use of Excel or Matlab. There is a requirement for a minimum number of problem sets to be handed. The grade is based 50% on problem sets and 50% on the exam. The course is thaught in English. A missed exam (continuation exam) can be given as an oral exam.

Course materials: Course reader.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	22.05.2007	15.00	50/100	C
EXCERCISES			50/100	

TEP4223 LCA and Eco-Efficiency

Lecturer: Professor Edgar Hertwich, Post doktor Glen Peters, Forsker Anders Hammer Strømman
Coordinator: Professor Edgar Hertwich
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course provides an introduction to LCA of products and energy systems for students in the Industrial Ecology program and other students who take this course as an elective. The aim of the course is to provide an in-depth knowledge of different methods used in LCA and their application, also for the evaluation of the eco-efficiency of companies and value chains. The aim is to enable students to do an LCA with the help of LCA software.
Recommended previous knowledge: Basic university maths. The number of students is limited to 50. Students from the Industrial Ecology program are guaranteed a space.
Academic content: Life-cycel assessment (LCA) is a tool to evaluate the environmental consequences of products and systems. LCA is used in eco-design, to evaluate energy systems, and to develop regulations for recycling. The course has following elements: aim and history; mathematical structure of LCA; process flow diagrams and analysis; use of input-output methods in LCA; evaluation of different types of environmental problems; weighting; and interpretation. The use of LCA in energy systems and corporate environmental accounting is covered. Students will write a project report based on a case study that is developed in cooperation with a Norwegian company.
Teaching methods and activities: The lectures are in English. The lectures cover the theory, while the project gives students practical experience. In case of a midded written exam (continuation exam) can the exam be changed to oral exam.
Course materials: H. Baumann, A-M. Tilman (2004): A Hitch Hiker's Guide to LCA. studentlitteratur.se
Edgar Hertwich: LCA Reader, Trondheim 2004.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	15.00	50/100	C
EXCERCISES			50/100	

TEP5100 Industrial Ecology, Project

Lecturer: Professor Edgar Hertwich, Forsker Anders Hammer Strømman
Coordinator: Professor Edgar Hertwich
Weekly hours: Autumn: 24S = 15.0 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The project gives students knowledge and skills to address scientific problems and to report results. Learning includes the application of industrial ecology methods towards practical, interdisciplinary problem solving or in scientific work.
Recommended previous knowledge: A precondition is that the student has taken courses which provide a sufficient qualification for the project work.
Academic content: This subject addresses the systems analysis of environmental issues from a technical, economic and industrial perspective. It makes use of life-cycle assessment, input-output analysis, systems engineering, material flow analysis, cost-benefit analysis, risk analysis or related techniques. It addresess technical systems, products, households or organisations.
Teaching methods and activities: Supervised independent project.
Course materials: Information at start of semester.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

Department of Electrical Power Engineering

TET4115 Power System Analysis

Lecturer: Førsteamanuensis Eilif Hugo Hansen, Professor Arne Torstein Holen
Coordinator: Professor Arne Torstein Holen
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Exercises, Project work, Laboratory work with report

Learning objectives: The main objective of the course is to learn about power system behaviour under symmetrical and unsymmetrical faults, including basic principles for protection against such faults. Additionally, the students will learn basic principles for formulation and application of optimal power flow.
Recommended previous knowledge: TFE4100 Electric Circuits, TET4100 Circuit Analysis and
TET4150 Energy Systems or similar.
Academic content: Power system analysis focusing on symmetrical and unsymmetrical faults. Symmetrical components. Building power system description based on node impedance matrix.
Component modeling (transformers, lines and cables)for positive-, negative- and zero sequence. Alternative earthing systems. Basic principles for power system protection. Optimal power flow, formulation and application.
Teaching methods and activities: Lectures, mandatory written assignments, laboratory work and a project work using computer programs. Portfolio evaluation is the basis for the final grade in the subject. Parts of the portfolio are final exam (75%) and project work (25%). The final grade is given on standard form as a letter code. The course is given in English. Postponed/ repeated exams may be oral.
Course materials: Lecture notes (in English)
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	13.12.2006	09.00	75/100	D
EXCERCISES			25/100	

TET4120 Electrical Motor Drives

Lecturer: Professor Roy Nilsen
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project work, Laboratory work with report

Learning objectives: The course is aiming to give an introduction to converter topologies and control principles used in modern electrical motor drives.
Recommended previous knowledge: TET4110 Electrical Machines or similar knowledge.
Academic content: This course covers the most commonly used type of electrical motor drives. Part I gives an overview of different type of electrical motor drive, type of load functions including the impact of using mechanical gears/transmissions. In part II some simplified models of the most commonly used power electronic converter topologies are presented. Control- and modulation methods are included as well. Part III in the course is devoted to DC drives. Mathematical modelling is performed, analysis of steady state characteristics and as well as dimensioning of current- and speed controllers. In part IV a general model of AC machines are presented. This includes introduction of space vectors, transformations and transformed mathematical models. Scaled models, i.e. per unit models are introduced to simplify the mathematical model. In part V Permanent magnet synchronous is presented. Induction Motor Drives are discussed in part VI. In particular, the control principle- Rotor Flux Oriented Control ? is covered in details.
Teaching methods and activities: Lessons and projects assignment. The students will be divided into project groups to perform the projects. The projects will cover dimensioning, analysis and simulation of specific drive applications. Two laboratory exercises are mandatory. The final evaluation will be based on a written examination (counting 75%) and a project (counting 25%)based on % fulfillment. Final grading will be from A to F. The course is given in English. Postponed/repeated exams may be oral.
Course materials: Lecture notes ?TET4120 Elektriske Motordrifter?, manuals for simuleringsprogram.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.06.2007	15.00	75/100	D
EXCERCISES			25/100	

TET4160 Insulating Materials for High Voltage Applications

Lecturer: Professor Erling Ildstad
Weekly hours: Autumn: 3F+5Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Laboratory work with report

Learning objectives: The course aims to give an introduction to properties of different insulating materials used for design of High Voltage apparatus
Recommended previous knowledge: Basic Electric Field calculation, Physics and chemistry
Academic content: Properties of different insulation systems based on: gas, solids and liquid/paper. Mechanisms of electrical conduction, polarisation, dielectric loss and breakdown. Ageing mechanisms (partial discharges, thermal degradation,water treeing, etc.) and methods for condition assessment including environmental aspects.

Teaching methods and activities: Lectures, audithorium- and laboratory exercises. The laboratory exercises cover the topics: - Measurement of dielectric loss and detection of partial discharges in airgaps. Electric breakdown strength of airgaps exposed to AC, DC and impulse high voltage. The course is given in English. Postponed/repeated exams may be oral.
Course materials: Compendium
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.12.2006	09.00	100/100	D

TET4170 Electrical Installations

Lecturer: Førsteamanuensis Eilif Hugo Hansen
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project work, Laboratory work with report

Learning objectives: The course will give the students good skills in planning and dimensioning of low voltage installations for industry, residential and non-residential buildings.
Recommended previous knowledge: Basic electrial engineering
Academic content: Planning of electrical installations : Analysis of needs, calculation of power demands for heating and lighting.
Structures for electical systems, topology and topography. Low voltage distribution systems (IT,TT,TN). Distribution and dimensioning of circuits. Safety precautions for electrical installations. Equipment and methods for protection : Overcurrent protection, earth fault protection, overvoltage protection. Discrimination. Earthing systems. Installation and equipment. Installation bus systems. Emergency and backup power supply. Software tools.
Teaching methods and activities: Lectures, theory and laboratory exercises. Project work in groups. Postponed/repeated exams may be oral.
Course materials: Eilif H. Hansen : Elektroinstallasjoner (In Norwegian).
Forskrifter for elektriske lavspenningsanlegg (FEL) (Norwegian regulations, in Norwegian).
NEK400 : Elektriske lavspenningsinstallasjoner (Norwegian standard)
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2007	09.00	70/100	C
EXCERCISES			30/100	

TET4180 Electric Power System Stability

Lecturer: Professor Olav B Fosso
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project work

Learning objectives: The course aims to give basic knowledge about the dynamic mechanisms behind angle stability problems in electric power systems, including physical phenomena, modelling issues and simulations.
Recommended previous knowledge: TTK4105 Control Engineering, TET4110 Electrical Machines,TET4115 Power Systems Analysis
Academic content: 1. Steady state and transient system analysis using simplified models for the synchronous machine. 2. Power-frequency control and voltage control using a more detailed model of the synchronous machine, also including penstock and hydro turbine. Power system damping and application of FACTS components. Secondary control: active reserves and load following control. Teaching in class, exercises and project work. A group project work running through most of the semester is a major part of the home work. MATLAB is being used as a tool for modelling and simulation of various aspects of power system stability phenomena. The project is being graded and is given 25% weight at the final exam.
Teaching methods and activities: Lectures, exercises, computer simulations and project. The final evaluation will be based on a written examination (counting 75%) and a project (counting 25%) based on % fulfillment. Final grading will be from A to F. The course is given in English. Postponed/repeated exams may be oral.
Course materials: Book: Power System Dynamics and Stability, J Machowski; J Bialek, J Bumby, John Wiley & Sons, ISBN 0 471 97174 X (PPC), 0 471 95643 0 (PR). Lecture notes. Written assignments and computer programs.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.06.2007	09.00	75/100	D
EXCERCISES			25/100	

TET4185 Power Markets, Resources and Environment

Lecturer: Professor Ivar Wangensteen
Weekly hours: Spring: 3F+4Ø+5S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The main topic is an introduction to the deregulated power market, how generation planinng is done and how grid companies and the System Operatos attend to their responsibilities.
Recommended previous knowledge: Course TET4155 Energy Systems or the equivalent.
Academic content: Description of power markets with emphasise on the Norwegian/Nordic solution. System operation, tariffs and congestion management. Optimal power flow. Different models for energy and power market analysis.
Risk management. Generation planning and trade in an open market. Consideration for recourses and the environment.
Teaching methods and activities: Lectures, written assignements, project, excursion(s). The course is given in English. Postponed/repeated exams may be oral.
Course materials: Compendium
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	31.05.2007	09.00	100/100	D

TET4190 Power Electronics for Renewable Energy

Lecturer: Post doktor Marta Molinas
Coordinator: Professor Tore Marvin Undeland
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project work, Laboratory work with report

Learning objectives: The course describes and analyses the use of power electronics for improving renewable energy and also energy saving. The practical aspects of the theory presented are illustrated through problemsolving, laboratory exercises and projects.
Recommended previous knowledge: All students from Energy and Environment and all from Engineering colleges are eligible.
Academic content: Sustainable energy technologies as wind energy, solar power, wave energy, Fuel cells and hydrogen and gas are described. The use of power electronics is described in detail.
Convertion, control and monitoring of electric energy with the use of semiconductors. Methods for analyzing converters including resonance converters for design. Selection of converter topologies, power semiconductors and passive elements. Design of heat sinks and magnetic components. Industrial applications like SMPSs, UPSs and induction heating. Power electronics in the power system is described, like HVDC, FACTS and static reactive compensation,
Teaching methods and activities: Lectures and exercises, all in English. Compulsory laboratory experiments. Project work that will be presented in a seminar in November 2006. The final evaluation will be based on a written examination (counting 50%), two mid-term examinations(counting 40% based on % fulfillment) and the project with a presentation (counting 10 %). Final grading will be from A to F. Postponed/repeated exams may be oral.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	15.00	50/100	D
MIDTERM EXAMINATION			20/100	D
MIDTERM EXAMINATION			20/100	D
EXCERCISES			10/100	

TET4195 High Voltage Equipment

Lecturer: Professor Erling Ildstad, Professor Arne Nysveen, Professor II Magne Eystein Runde
Coordinator: Professor II Magne Eystein Runde
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The aim is to give knowledge on working priciples, design and operation of switching equipment, underground power cables and power transformers
Recommended previous knowledge: TET4160 Insulating Materials for High Voltage Applications
Academic content: The course gives a comprehensive introduction to the technologies that are employed in switching equipment, underground power cables and power transformers. The switching equipment sections cover switching over-voltages, the electric arc, arcing media (SF6, vacuum, air, oil), breaker designs, fuses, as well as gas insulated and air insulated substations. The cable part describes various designs and technologies used for underground cables, power rating evaluations, corrosion, and cable termination and splicing. The transformer section covers the electric insulation system, stresses during transient over-voltages, thermal aspects, protection, winding connections, and standards for transformer testing.
Teaching methods and activities: Lectures and tutorials. Excursion to Norwegian manufacturers of power cables, transformers and switchgear. The course is given in English. Postponed/repeated exams may be oral.
Course materials: Compendium

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	07.06.2007	09.00	100/100	D

TET4200 Maritime and Offshore Power Systems

Lecturer: Professor Roy Nilsen, Professor Arne Nysveen
Coordinator: Professor Arne Nysveen
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students will learn how to design, construct and operate marine power systems, i.e. power systems on ships with electrical propulsion, floating vessels for oil&gas production and subsea power systems.
Recommended previous knowledge: Electrical Machines. Electrical Power Systems.
Academic content: Application of electrical power on marine installations, i.e ships with electrical propulsion, floating vessels for production of oil&gas and subsea oil&gas process installations. Rules and regulations. Power distribution layout, system dimensioning, short circuit analysis, start-up of large motors, thermal and mechanical dimensioning, cable modelling. Topside and subsea large motor drives. Power generation. Subsea motors, subsea high voltage equipment. Electrical heating of subsea pipelines.
Teaching methods and activities: Lectures and compulsory exercises. Excursions to oil companies and equipment manufactures. Postponed examination may be changed from written to oral examination. The course is given in English.
Course materials: Stated at start of the semester.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2007	09.00	100/100	D

TET5100 Power Engineering Updates

Lecturer: Professor Robert Nilssen, Professor Arne Nysveen
Coordinator: Professor Arne Nysveen
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The aim of this course is to give students with a Bachelor in Power Engineering a deeper understanding of different subtopics in electromagnetics and circuit analysis needed for master studies in electrical power engineering.
Recommended previous knowledge: Students with a BSc in Electrical Power Engineering/
Students with a three year college education in the field of electrical power engineering.
Academic content: Design of installations and equipment requires both a physical understanding and knowledge of mathematical modelling. Further there is a need to use analytical and numerical methodes to solve sets of equations. In this course several practical problems connected to installations and devices will be highlighted. The students use basic field- and circuit theory to determine parameters which characterise the installation or the different components. Adressed topics are: Circuit models for magnetic, thermal and electrical problems; analogies. Use of dielectric insulation material, field control, shielding. Conductor and contact problems, overheating, bus dimensioning. Magnetic fields, magnetic materials, dynamic magnetic coupled circuits, windings. Eddy currents - surface power density, proximity effects. Inductance, resistance and capacitance. Circuit models. Grounding models. Line/Cabel models. Forces. Energy consideration. Simple modeles for electrical machines. Thermal fields, material characteristics, heat transfere, cooling and determination of parameters. Description of electrical power systems based on node admittance and node impedance. Load flow analysis: Calculation of voltage balance and power flow in a power system.
Teaching methods and activities: Lectures and compulsory written assignements. Postponed examination may be changed from written to oral examination. The course is given in English.
Course materials: Stated at the start of the semester.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	A

Department of Physics

TFY4225 Nuclear and Radiation Physics

Lecturer: Professor Tore Lindmo
Weekly hours: Autumn: 4F+3Ø+5S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Laboratory exercises

Learning objectives: This course deepens the students' understanding of the constituents, properties and processes of atomic nuclei, as well as the properties, interaction processes and practical use of ionizing radiation from nuclear processes. Students will be able to find and use relevant data to assess and evaluate the occurrence and effects of nuclear processes and ionising radiation.
Recommended previous knowledge: Course TFY4250 Atomic and molecular physics, or equivalent. Some background in quantum mechanics (TFY4205 Quantum mechanics or equivalent) is useful.
Academic content: This course describes models for the constituents and properties of nuclei, nuclear processes and particle interactions with emphasis on alpha, beta and gamma radiative processes as examples of strong, weak and electromagnetic interactions. Description of various mechanisms for interaction between ionizing radiation and matter, and introduction to radiation dosimetry. The course includes applications such as detection of radiation, nuclear power generation, environmental exposure to ionizing radiation, risk assessment, and radiation protection.
Teaching methods and activities: Lectures, problem solving, mandatory laboratory assignments. Teaching will be in English if students on international master programs are attending the course. Mid-term exam weighs 20 % in total grade score. Postponed/repeated exams may be oral.
Course materials: J. Lilley: Nuclear Physics, John Wiley og Sons, 2001. Some supplementary material.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.12.2006	09.00	80/100	C
MIDTERM EXAMINATION			20/100	C

TFY4265 Biophysical Micromethods

Lecturer: Professor Catharina de Lange Davies
Weekly hours: Autumn: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course aims at giving an introduction in principles and methods for investigations og biological macromolecules, cells and various soft materials, by the use of various microscopy techniques and spectroscopy.
Recommended previous knowledge: Background in Molecular Biophysics equivalent of course TFY4310, Molecular Biophysics
Academic content: Mechanisms for molecular excitation and de-excitation. Interactions between light and biological specimens. Light microscopy. Fluorescence microscopy. Confocal and multi-photon microscopy. Nonlinear optical imaging. CCD camera. Lasers. Flow cytometry. Optical tweesers and scissors. Intermolecular forces. Atomic force microscopy (AFM). Interactions between electron and biological specimens. Electron-optics. Transmission (TEM), scanning (SEM) and scanning transmission (STEM) electron microscopy. Electron diffraction. Preparation of biological specimens for microscopy.
Teaching methods and activities: Lectures and laboratory excercises. Teaching will be in English if students students on international master programs are attending the course. The form of the examination may be changed from written to oral at eventual 2nd trial ("kontinuasjonseksamen").
Course materials: Compendium
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.12.2006	09.00	80/100	D
EXCERCISES			20/100	

TFY4310 Molecular Biophysics

Lecturer: Professor Arne Mikkelsen
Weekly hours: Autumn: 4F+3Ø+5S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Laboratory exercises

Learning objectives: The student shall attain a fundamental understanding of the basic molecular principles behind the physical properties of biopolymers and biopolymer systems, and be trained in central experimental methods for measurement of these properties.
Recommended previous knowledge: Basic physics, mathematics and chemistry.
Academic content: Kovalent bonds. Obital theory. Inter and intra molecular interactions. Molecular dynamics. Hydrofobic interactions. Water-lipid interacations. Chain molecule conformations and statistic properties. Macromolecular rheology: Viscosity and viscoelasticity. Macromolecular gels. Translational and rotational diffusion. Centrifugation techniques. Nuclear spin resonance. Electron spin resonance. Optical absorption spectroscopy. Circular dichroism. Optical rotational dispersion. X-ray diffraction, fiber diagrams. Electron diffraction. Electron microscopy. Light scattering.
Teaching methods and activities: Lectures, voluntary problems and mandatory laboratory exercises. Teaching will be in English if students on international master programs are attending the course. The second exam (in August) may be oral.
Course materials: Elgsæter, Mikkelsen og Næss: Molekylær biofysikk, kompendium. English version in preparation.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	C

TFY4315 Biophysics (Special)

Lecturer: Professor II Einar K Rofstad
Coordinator: Professor Tore Lindmo
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Laboratory exercises

Learning objectives: Introduction to the interaction of ionizing radiation in biomaterials, with emphasis on dosimetry and dose-modifying factors. Use of ionizing radiation in cancer therapy.
Recommended previous knowledge: Course TFY4225 Nuclear and radiation physics or equvalent is required. Knowledge of biochemistry (TBT4100 or equivalent) would be useful.
Academic content: This course gives an introduction to the deposition of energy from ionising radiation in biomaterials. Topics presented are dosimetry at the macroscopic and microscopic level, repair ans restitution processes, dose-response relationships, direct and indirect radiation effects, the oxygen effect, sensitising and protective agents. Use of ionizing radiation in cancer therapy.
Teaching methods and activities: Lectures at NTNU. Mandatory laboratory assignments during excursion to the Norwegian Radium Hospital in Oslo. Teaching will be in English if students on international master programs are attending the course. Postponed/repeated exams may be oral.
Course materials: E. J. Hall: Radiobiology for the Radiologist, 5. utgave, Lippincott Williams og Wilkins, 2000. Some supplementary material.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2007	09.00	100/100	D

TFY4320 Medical Physics

Lecturer: Professor II Arne Skretting
Coordinator: Professor Tore Lindmo
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Laboratory exercises

Learning objectives: Introduction to medical physics, with emphasis on different imaging modalities and the principles of medical imaging.
Recommended previous knowledge: Course TFY4225 Nuclear and radiation physics or equivalent is required.
Academic content: Medical imaging modalities based on nuclear medicine (SPECT, PET), X-ray computed tomgraphy (CT), ultrasound, and magnetic resonance imaging. Theory for image formation, image noise, image reconstruction and image processing. Quality assurance of medical imaging diagnostics. Instrumentation for delivery and verification of radiation therapy. Electrical safety of medical equipment.
Teaching methods and activities: Lectures at NTNU. Mandatory laboratory assignments during excursion to the Norwegian Radium Hospital in Oslo. Teaching will be in English if students on international master programs are attending the course. Postponed/repeated exams may be oral.
Course materials: S. Webb: The Physics of Medical Imaging, Adam Hilger, 1990. Some supplementary material.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.06.2007	09.00	100/100	D

Department of Geology and Mineral Resources Engineering

TGB4135 Basin Analysis

Lecturer: Professor Stephen John Lippard
Weekly hours: Spring: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To give an overview of the formation and development of sedimentary basins.
Recommended previous knowledge: Knowledge equivalent to Structural Geology and Sedimentology and Stratigraphy.
Academic content: Classification of sedimentary basins according to tectonic environment. Formation mechanisms of different basin types and controlling factors of sedimentary filling. Methods of evaluating the subsidence and thermal history of basins.

Teaching methods and activities: Lectures, exercises, colloquia.
The course will be held in English if international masterstudents attend.
Course materials: P.A.Allen & J.R. Allen: Basin analysis, Principles and Applications, Blackwell Scientific Publications.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	06.06.2007	09.00	100/100	D

TGB4160 Petroleum Geology

Lecturer: Førsteamanuensis Sverre Ola Johnsen, Professor Stephen John Lippard, Professor Mai Britt E. Mørk
Coordinator: Førsteamanuensis Sverre Ola Johnsen
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course aims at making the students comfortable with the processes leading to formation and accumulation of hydrocarbons in the earths crust. Further, to give the students an overview of the geological development and geological conditions on the Norwegian continental shelf and in other important petroleum provinces.
Recommended previous knowledge: BSc in geosciences.
Academic content: Composition and classification of petroleum. Conditions controlling primary production and accumulation of organic matter to petroleum. Primary and secondary migration of petroleum. Porosity and permeability in rocks. The role of depositional environment as a controlling factor for reservoir rock quality. Classification and formation of petroleum traps. Basin types and their petroleum potential. Principles of basin analysis. The geological development of the Norwegian continental shelf. Examples of Norwegian oil and gas fields. Geological conditions in some selected petroleum provinces in other parts of the world. The exercises include construction of burial graphs, maturation calculations, construction and interpretation of structure maps, thin section microscopy of potential reservoir rocks and a comprehensive exercise where the petroleum potential within a given area should be evaluated.
Teaching methods and activities: Lectures and exercises. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: J. Gluyas & R.E. Swarbrick: Petroleum Geoscience,
Blackwell Publishing.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	09.00	100/100	D

TGB4170 Diagenesis/Reservoir Quality

Lecturer: Professor Mai Britt E. Mørk
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Processes determining reservoir rock quality like porosity, permeability, pressure and kerogenity.
Recommended previous knowledge: Recommended basic knowledge of sedimentology and chemistry.
Academic content: Physical and chemical changes in sediments from the depositional environment to deep burial. Factors that control destruction or preservation of porosity. Siliciclastic sediments and carbonates. Interpretation of "cases".
Teaching methods and activities: Lectures and obligatorial exercises. Colloquium where each student has an obligatorial presentation of selected topic. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Articles and compendium.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2007	09.00	75/100	D
MIDTERM EXAMINATION			25/100	D

TGB4235 Spreading of Pollution

Lecturer: Professor Sveinung Løset
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students shall have got a thorough introduction to mechanisms for dispersion and transport of pollution in various recipients (water, soil and air).
Recommended previous knowledge: Elementary knowledge in hydro-dynamics and hydro-geology and statistics.
Academic content: Ocean dispersion: Tidal currents, air driven currents, coastal currents. An overview of principles for calculation of currents in oceans and coastal waters. Dispersion in the atmodphere: Geostrophic wind, vertical wind profile,

topographic influence. Mixed processes: Spreading by shear, turbulent diffusion, density driven diffusion (in plumes). Statistical methods and modelling. Degradation processes (oil): Evaporation, emulsion formation, dispersion, solubility in water, biological and photo-chemical degradation. Airborne dust: Spreading and retention times.
Teaching methods and activities: Lectures, exercises and colloquia. Two midterm tests will be arranged and 2/3 of the exercises must be passed to get access to the exam. The midterm tests count 25% of the final grade. The course is taught in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes and selected papers. To be announced at start of course.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	75/100	D
MIDTERM EXAMINATION			25/100	D

TGB4715 Petroleum Geology, Specialization

Lecturer: Professor Stephen John Lippard, Professor Mai Britt E. Mørk
Coordinator: Førsteamanuensis Sverre Ola Johnsen
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The specialization course aims to deepen knowledge in selected geological fields through project work combined with back up topics. In addition, the specialization course will form a preparation to the diploma work in that the student will become familiar with scientific working methodology.
Recommended previous knowledge: It is supposed that the student has completed a study which permits the selection of a specialization course in petroleum geology. The study can be in accordance with the requirements given in the study plan or exceptionally a study plan that is approved by the teacher.
Academic content: Petroleum geology includes the development and application of all geological methods and application of geophysical methods of significance for exploration of petroleum, mapping and description of the petroleum reservoir, as well as all measurements made in a well. Specialization can be carried out within:
Basin Modelling/Sedimentology/Structural Geology/Diagenesis/Reservoir Geology/Maturity and Migration of Petroleum.
The most relevant topics for specialization are:
Geoscientific field course on Svalbard (Tjåland)
Petroleum Geology - sedimentology (Johnsen)
Petroleum Geology - tectonics (Lippard)
Reservoir Geology/Diagenesis (Mørk)
Plate tectonics and basin formation (Torsvik)
Seismic imaging of sedimentary sequences, field course (Landrø/Johnsen)
Teaching methods and activities: The course is divided into two; project work equivalent to 15 stp and a course study equivalnt to 7.5 stp. Project topics should be chosen in cooperation with a teacher. The final grade is determined as a combination of the exam (1/3) and project work (2/3). Delayed exam for the theoretical part will be held within the end of the exam period.
Course materials: Given at the start of the semester.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TGB5100 Rock Engineering, Advanced Course

Lecturer: Professor Bjørge Brattli, Professor Einar Broch, Professor Charlie Chunlin Li, Professor II Ming Lu, Professor Bjørn Nilsen
Coordinator: Professor Bjørn Nilsen
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course objective is to offer the students a deeper understanding of important key issues of rock engineering as described above.
Recommended previous knowledge: Basic course TVM5145 Geology and tunneling, basic course TGB4185 Engineering Geology, or a similar basic level knowledge of geological engineering.
Academic content: Selected topics in rock engineering such as: Engineering geological investigations, rock mass properties, weathering of rocks, rock stress measurements, numerical modelling, rock slope stability, dam foundation, tunnelling in soft rocks, hydropower tunnels in swelling and squeezing rocks, cases of instability in tunnels, TBM excavation, etc.

Teaching methods and activities: Lectures, exercises, laboratory assignment, 3 days obligatory field course. Report based on field investigations is to be submitted and approved for admission to the exam. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: R.E.Goodman: Engineering Geology, John Wiley & Sons, New York. Nilsen og Palmstrøm: Engineering Geology and Rock Engineering, NFF/NBG Handbook No. 2, 2000. Selected papers and lecture notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.12.2006	09.00	100/100	D

TGB5110 Geology and Tunnelling, Basic Course

Lecturer: Professor Einar Broch
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the first year of the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. The course covers the basics in engineering geology and tunnelling for civil engineers.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineering or similar. The course is a prerequisite for TVM5130 Hydropower Project.
Academic content: Basic engineering geology, rock mechanics, rock blasting and tunnelling for underground hydropower projects.
Teaching methods and activities: The lecturers come from the university and the hydropower industry, all with international experience. All lectures and exercises are given in English. The lectures will be concentrated during the first half of the spring semester to prepare for TVM5130. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Books from the series "Hydropower Development" and supplementary lecture notes, all in English.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	100/100	D

Department of Industrial Economics and Technology Management

TIØ4135 ICT Economics - Planning and Economics of Tele and Information Services

Lecturer: Professor Alexei A. Gaivoronski, Førsteamanuensis II Josip Zoric
Coordinator: Professor Alexei A. Gaivoronski
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Develop capability for economic analysis, modeling and planning of modern telecommunications and information services and planning of telecommunication networks
Recommended previous knowledge: Knowledge which corresponds to TIØ4115 Microeconomics and Optimization and TIØ4125 Investment Analysis.
Academic content: Course is composed from three parts: Economics of networks, telecommunications and information industry, modeling of telecommunication systems with the help of the methods of operations research and managerial economics, and planning of competitive IKT services, in particular internet based services and e-commerce.
Teaching methods and activities: Lectures and seminar presentations.
Course materials: Is given at the beginning of semester.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	09.12.2006	09.00	100/100	A

TIØ4180 Innovation and Information Management

Lecturer: Førsteamanuensis Truls Erikson, Førsteamanuensis Alf Steinar Sætre
Coordinator: Førsteamanuensis Alf Steinar Sætre
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The goal of the course is to give the students an overview of, and understanding of, central problems and methods regarding innovation, product development and information management in existing organisations.

Recommended previous knowledge: This couse assumes a basic knowledge of organization theory and organizational behavior.
Academic content: The course incorporates the following themes: innovation in organisations, intrapreneurship and co-operation between companies regarding development projects and planning. The course also deals with the connection between organisation and innovation , and how communication- and decision-processes interact with innovative processes in existing organisations, ICT and new forms of organisations, service, innovation, customer adaptation and information management and transformation.
Teaching methods and activities: The course uses both lectures and compulsory excercises. Some parts of the lectures may be done in the form of seminars. Marking is based 100% on excercises. The course in run in English.
Course materials: Will be available at course start.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TIØ4195 Environmental Management and Corporate Social Responsibility

Lecturer: Professor Annik Magerholm Fet, Amanuensis John Eilif Hermansen
Coordinator: Professor Annik Magerholm Fet
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject shall give knowledge, understanding and skills to support the endeavours for sustainability, better environmental management and industrial practise under the vision of sustainable development and corporate social responsibility. The subject shall give understanding of ethical dilemmas and show connections between environmental and social responcibility in global value chains.
Recommended previous knowledge: The course is compulsory for SHE branch students and can be choosen by students at the Indecol programme. Other students may attend by agreement with the Institute of Industrial Economics and Technology Management. Reserved students at SHE.
Academic content: The course departs from the principles of UNs Global Compact, the Global Reporting Initiatives GRI and Corporate Social Responsibility CSR, national and international environmental status and policy.
It gives further insight into how environmental requirement from customers, authorities and other stakeholder in industrial networks and society impact the organization's situation regarding competitiveness in a life cycle perspective. It further includes environmental management, CSR, legislation, international standards like EMAS and ISO-14000-standards Special attention is given to tools for environmental management like environmental analyses, LCA, environmental accounting, performance indicators, business environmental and sustainability reporting and auditing methodology.
Teaching methods and activities: Lectures and group based student works like lecturer, presentations and project work / field work connected to a company. Postponed/repeated exams may be oral.
Course materials: Is given at semester start
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	50/100	D
EXCERCISES			50/100	

TIØ4205 Safety, Health and Environment - Methods and Tools in SHE Practice

Lecturer: Professor Jan Hovden, Professor II Urban Anders Gunnar Kjellen
Coordinator: Professor II Urban Anders Gunnar Kjellen
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Term assignments

Learning objectives: The course will give knowledge of methods and tools for systematically and efficient preventive SHE-work in industrial organisations.
Recommended previous knowledge: TIØ4185 Safety, Health and Environment - Non-Industrial Work Environment, or similar backgrpund. The subject is compulsory for students at the section of Safety, Health and Environment. Other students can apply to the department to participate. Reserved students at SHE.
Academic content: The course presents principles and methods for identification and analysis of accident risks as well as principles and methods for development and implementation of effective preventive measures through experience feedback and learning. The main focus is on preventing occupational accidents; nevertheless prevention of major accidents and acute environmental discharges are discussed as well. A theoretical part of the course deals with accident models, safety measures and barriers and learning from unwanted events in organisations. Organisational and individual obstacles for efficient learning and prevention are dealt with. Methods and tools for accident and near-accident reporting and investigation, inspections, SHE information systems, job-safety analysis and risk assessment of machinery are presented. SHE-audits and analysis of accident

data will be emphasized and put into practice in exercises. The course deals with methods for identification and evaluation of safe behavior, including human factors related to safety problems in complex socio-technical systems.
Teaching methods and activities: Lectures, study groups, exercises that includes field research in industrial companies, mid-term tests.
Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (60%), mid-term (20%) and assignments (20%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: U. Kjellén: Prevention of Accidents through Experience Feedback, Taylor og Francis.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2007	09.00	60/100	A
MIDTERM EXAMINATION			20/100	A
EXCERCISES			20/100	

TIØ4265 Industrial Management 3 - Strategic Management

Lecturer: Førsteamanuensis Elsebeth Holmen, Professor Olav Solem
Coordinator: Førsteamanuensis Elsebeth Holmen
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course provides an introduction to strategic management. The course aims to enable the students (1) to understand central issues, concepts, and methods within the strategic management of firms and (2) to apply this understanding in analyses and discussions of various company cases. The topic is mandatory for all students with a specialisation in Business administration.
Recommended previous knowledge: TIØ4165 Industrial Management 2, or similar.
Academic content: Historical development of the field of strategic management. Reasons why companies need to change. Company mission. Formulating, implementing, and managing strategy. Tools and methods for strategic management at the business unit level versus the corporate level. Formalised versus informal strategic collaboration. How companies both change their business contexts and and adapt to changing business contexts. Managerial and organisational problems when adopting new strategies. Several schools of thought within strategic management will be addressed.
Teaching methods and activities: Lectures, case discussions and compulsory exercises. A written, group-based exercise is compulsory; it is to be handed in halfway through the course and counts for 50% of the grade. A written examination by the end of the course constitutes the remaining 50% of the grade. In cases of re-examination, an oral exam may substitute the written exam. If English-speaking students attend, the course will be given in English.
Course materials: Textbook and articles. To be announced.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	50/100	A
EXCERCISES			50/100	

TIØ4270 Human Resource Management

Lecturer: Amanuensis Steinar Nygaard
Weekly hours: Spring: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students shall have knowledge and skills neccessary to manage and develope human resources in sustainable, productive organizations.
Recommended previous knowledge: Basic knowledge of organizational theory and/or organizational and work psychology.
Academic content: The concepts of work and organizing. Personnel strategy and policy. Planning, selection and termination of human resources. Performance management, remuneration, competence. Labour law and rules of work life. Ethical topics.
Teaching methods and activities: Lectures and discussions. 6 exercises, 4 of which must be approved before beeing permitted to examination.
Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and the four approved exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Assigned at course start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2007	09.00	50/100	C
EXCERCISES			50/100	

TIØ5200 Project Management 3 - Project Organizations

Lecturer: Førsteamanuensis Bjørn Otto Elvenes, Førsteamanuensis Tim Kristian Andreas Torvatn
Coordinator: Førsteamanuensis Bjørn Otto Elvenes
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course introduces the student to theories and experiences regarding the organizing and management of projects and groups. Exercises and class room discussions encourages the student to reflect upon the relevance and usefulness of different theories and to search for alternative solutions to practical problems.
Recommended previous knowledge: For students of the International Master Degree in Project Management. A small number of other students can be admitted after application to the department. The course is held in English if foreign students are present.
Academic content: Introduction to systems thinking and systems theory. Systems regulation and management. Project environment. From need to specification. Fundamental principles of organizing and organizational design. Organizing project structures. Establishing and organizing group work. Tools for enhancing group productivity and effectiveness. Motivating project groups. Project leadership. Project politics
Teaching methods and activities: Lectures and group based exercises. Class room discussion. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: To be announced at startup.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	100/100	C

TIØ5210 Project Management 5 - Programme and Portfolio Management

Lecturer: Førsteamanuensis Bjørn Otto Elvenes, Førsteamanuensis Tim Kristian Andreas Torvatn
Coordinator: Førsteamanuensis Tim Kristian Andreas Torvatn
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To understand how to handle a portfolio of projects, how to manage multi- and inter-organisational projects and how to evaluate a number of projects when not all can be chosen.
Recommended previous knowledge: Course TIØ5200 Project Management 3 or similar background. The course is meant for students following the International Master in Project Management. The course is run in English.
Academic content: The course contains the following parts: The project environment, stakeholders, uncertainty in environments, multi-project management, the project office, learning across projects, handling project managers, programme management, co-ordination among projects, interorganisational projects and choosing between projects.
Teaching methods and activities: Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: To be announced.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	50/100	A
EXCERCISES			50/100	

TIØ5215 Project Management 6 - SHE and Purchasing in Projects

Lecturer: Førsteamanuensis Bjørn Otto Elvenes, Amanuensis John Eilif Hermansen, Førsteamanuensis Tim Kristian Andreas Torvatn
Coordinator: Førsteamanuensis Tim Kristian Andreas Torvatn
Weekly hours: Spring: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The aim of the SHE-part of the subject is to develop understanding and skill, and provide for knowledge on how environmental and SHE-management can be an integrated part of project organisations and enterprises and thus contribute to solving the environmental and SHE requirements and challengers of the enterprises. The aim of the purchasing/ contract-part of the subject is to teach the student how to handle projects in relations to purchasing, both as customer and as a project organisation. Both theoretical understanding and some practical methods will be taught.
Recommended previous knowledge: Course TIØ5200 Project Management 3 or similar background. The subject is designed for the International Master in Project Management. The course is in English.

Academic content: The course deals with challenges related to Safety-, Health and Environment work in projects and project-like organizations. International agreements and the environment in a global setting is an important parts of this. Furthermore, the course deals with challenges related to purchasing in projects and to projects as a way of doing purchasing. Within this part, both commercial and legal challenges will be presented.
Teaching methods and activities: Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: To be announced.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	50/100	A
EXCERCISES			50/100	

TIØ5220 Project Management, Specialization

Lecturer: Førsteamanuensis Elsebeth Holmen, Førsteamanuensis Ann-Charlott Pedersen, Førsteamanuensis Tim Kristian Andreas Torvatn
Coordinator: Førsteamanuensis Ann-Charlott Pedersen
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The goal of this course is to teach students to produce an academic report within their field of specialization. The goal of the theoretical subjects is, together with the theoretical part of the report, to allow students to specialise within a particular branch of project management.
Recommended previous knowledge: Obligatory courses from the International Master of Project Management.
Academic content: The specialization is meant for students following the Master of Science in Project Management, and for Master of Technology students with Project Management as their specialization. The course is divided into two parts; a written project (15 study points) and two theory subjects (2x3.75 study points) for a total of 22.5 study points.
The two theory subjects offered for the students are Inter-organisational projects (Ann-Charlott Pedersen and Elsebeth Holmen) and Qualitative methods (Tim Torvatn). There will be an oral examination of the theory parts, and students should expect to be examined in both theory subjects. More information about these courses will be given by the home pages of the course during the Spring semester. Students can apply for other theory subjects, but the supervisor AND the course co-ordinator must agree to all such substitutions.
The project part of the course is usually done in groups of 2-3 students, and each group will receive one or more supervisors. The theme of the project is decided in co-operation with the co-ordinator and a supervisor is assigned accordingly. Supervisors from co-operating departments in the program will be used when their academic specialty is relevant. A list of possible projects will be distributed in the Spring semester, and students can also suggest their own themes.
Teaching methods and activities: The theory subjects will be held in seminars and contain lectures, student presentations and discussions. Examination is oral, and delayed examination will be held later in the same exam period. The project part is supervised and should result in a written report judged by academic standards.
Course materials: To be announced later.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	09.12.2006	09.00	33/100	D
EXCERCISES			67/100	

Department of Structural Engineering

TKT4130 Continuum Mechanics

Lecturer: Amanuensis Jan Bjarte Aarseth, Professor Zhiliang Zhang
Coordinator: Amanuensis Jan Bjarte Aarseth
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Recommended previous knowledge: Strength of materials at the level of subject TKT4100 and fluid mechanics at the level of subject TEP4100.
Academic content: Foundation of continuum mechanics: Euler's and Cauchy's equations of motion, Cauchy's stress-theorem, stresstensor, stress-analysis, strain-analysis for small deformations, kinematics of deformation, mechanical and thermal balance of energy. Tensors:Index-notation, coordinate-transformations, symmetric tensors of 2. order, principal values and principal directions. Theory of elasticity: The law of Hook for an isotropic, linear, elastic material, thermoelasticity, plane stress and plane strain. Airy's stressfuction: Disk with a hole, Thick-walled cylinder, rotating disk, knife-load on a semi-infinite solid, etc. Fluid

mechanics: Equations for control volumes, Reynolds transport theorem, perfect fluid, circulation, vorticity, linear viscous fluid, the Navier-Stokes equations, dissipation, potentional flows.
Teaching methods and activities: Lectures and problem-solving. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: F. Irgens: Continuum mechanics, compendium.
F. Irgens: Formelsamling i Mekanikk, Tapir.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	100/100	C

TKT4135 Mechanics of Materials

Lecturer: Professor Kjell H. Holthe
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The topic will give a thorough knowledge and understanding of the mechanical response of solid materials.
Recommended previous knowledge: Knowledge corresponding to the course TKT4130 Continuum Mechanics.
Academic content: Anisotropic elasticity: Composite materials, Theory of laminated beams and plates.
Linear viscoelasticity: Mechanical models, Boltzmanns superpositions principle, material models, beam bending and torsion of beams, the priciple of correspondance, dynamic response, viscoelastic support.
Nonlinear viscoelasticity: the Norton model, the Zener-Hollomon model, bending of beams, torsion tests.
Plasticity theory: Flow critera. Mises and Tresca critera, isotropic and kinematic hardening, flow rules, Drucker's postulate, idela elastoplastic Mises and Tresca material, Mises material with isotropic hardening, limit load theorems, flow line theory.
Teaching methods and activities: Lectures, 2/3 of the problem sets must be approved to take the final exam. 2 projects must be approved. The lectures will be in english. The midterm examination will only count in a positive direction. If the result of the midterm examination is poorer than the result in the written examination, the final grade will be based on the weighted sum of the written examination (80%) and the midterm examination (20%). If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Compendium.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.06.2007	09.00	80/100	C
MIDTERM EXAMINATION			20/100	C

TKT4150 Biomechanics - Mechanical Properties of Living Tissues

Lecturer: Amanuensis Jan Bjarte Aarseth, Professor Kjell H. Holthe, Professor Bjørn Helge Skallerud
Coordinator: Professor Bjørn Helge Skallerud
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Recommended previous knowledge: The course is based on basic courses in solid and fluid mechanics. Some background in continuum mechanics is recommended.
Academic content: With basic relationships from solid and fluid mechanics, rheology, and continuum mechanics the following topics are addressed: visco-elastic properties of biofluids and biosolids, blood rheology, blood flow in arteries and veins, mechanical behaviour of skeletal muscles/heart muscle, mechanical properties of tissues such as bone and cartilage. Some parts will be based on current research in biomechanics carried out at NTNU. Some exercises are mandatory.
Teaching methods and activities: Lectures, mandatory exercises and lab. 2/3 of the exercises approved is minimum for exam admittance. A midterm test has 25% weight of final grade. Postponed/repeated exams may be oral.
Course materials: The course uses selected topics from Y.C.Fung. The lecture notes by F Irgens is the basis for the course.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	75/100	D
MIDTERM EXAMINATION			25/100	D

TKT4201 Structural Dynamics

Lecturer: Post doktor Anders Rönnquist, Professor Einar Norleif Strømmen
Coordinator: Professor Einar Norleif Strømmen
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Excercises

Learning objectives: The course is intended to provide basic knowledge for the determination of structural response from dynamic loads, and some experience in the modelling and calculation of dynamic response for simple structural systems.
Recommended previous knowledge: Prerequisites: Finite element methods for beams and frames. Mass point dynamics. Fourier-analysis.
From 2006 there will be lectures in English if appropriate.
Academic content: The following is covered: The single-degree-of-freedom system. Response of dynamic loads by superposition in time and frequency domain. Time domain integration. Continuous systems (partial differential equations), generalised single-degree-of-freedom systems, dynamic respons by modal superposition. Damping mechanisms and models. The equation of motion in a matrix format. Numeric solution to the problem of free oscillations. Direct solution of the equation of motion in time and frequency domain. Energy methods in dynamic systems. Response calculations for relevant load cases.
Teaching methods and activities: Lectures and model illustrations. Numerical and computer exercises. Laboratory projects and demonstrations of dynamic response of simple structural models. The course will be given in English if necessary. At the re-sit exam the examination form may be written or oral.
Course materials: A.K. Chopra: Dynamics of structures, 2nd ed., Prentice Hall, 2001. Lecture notes.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	09.06.2007	09.00	80/100	D
EXCERCISES			20/100	

TKT5100 Durability, Maintenance and Repair of Concrete Structures

Lecturer: Professor II Roar Myrdal, Professor Øystein Vennesland
Coordinator: Professor Øystein Vennesland
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Literature paper

Learning objectives: To provide an understanding of degradation mechanism and general principles and methods for maintenance and repair.
Recommended previous knowledge: B.Sc degree in Civil Engineering or equivalent.
Academic content: A short description of the main construction materials and mechanisms of degradation - with special emphasise on degradation mechanisms of steel and concrete structures. Methods for structural assessment, both in field and in laboratory. Planning and execution of structural assessment. Maintenance and repair of steel and concrete structures, including electrochemical techniques.
Teaching methods and activities: Lectures, exercises and laboratory work.
Course materials: Textbook, lecture notes and selected papers.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	16.12.2006	09.00	100/100	D

Department of Mathematical Sciences

TMA4255 Design of Experiments and Applied Statistical Methods

Lecturer: Førsteamanuensis John Sølve Tyssedal
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The objective of the course is to give the students a solid foundation for use of basic statistical methods in industry and technology. In addition the students shall be capable of planning collection of data and to use statistical software for analysing data. The course is primarily for students who do not attend the Industrial Mathematics Programme.
Recommended previous knowledge: The course is based on TMA4240/4245 Statistics, or equivalent.
Academic content: Hypotheses testing. Design of experiments. Analysis of variance. Transformations. Estimation of uncertainty in estimates. 2^k-experiments and fractions of these.
Special designs. Response surface methods. Simple and multiple linear regression. Residual plots and selection of variables. Contingency tables. Statistical process control. Non-parametric methods.
Teaching methods and activities: Lectures and exercises with the use of a computer (computing programme MINITAB). The lectures may be given in English. Portfolio assessment is the basis for the grade awarded in the course. This portfolio comprises a written final examination 80% and selected parts of the exercises 20%. The results for the constituent parts are to be given in %-points, while the grade for the whole portfolio (course grade) is given by the letter grading system.The course may be given in English if sufficiently many students don't master Norwegian. Retake of examination may be given as an oral examination.
Course materials: R. E. Walpole, R. H. Myers, S. L. Myers and K.Ye: Probability and Statistics for Engineers and Scientists, 7th ed., Prentice Hall, 2002.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	80/100	A
EXCERCISES			20/100	

TMA4270 Multivariate Analysis

Lecturer: Førsteamanuensis Mette Langaas
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course gives a theoretical introduction to statistical methods for multivariate data (i.e. several variables are measured for each observational unit, and we are interested in using all the variables and their correlation). The students shall be capable of conducting simple statistical analyses of multivariate data using the programming package R.
Recommended previous knowledge: Subject TMA4240/TMA4245 statistics or equivalent. The subject require a mature understanding of statistics and we recommend also the subjects TMA4260 Industrical statistics or TMA4255 Design of experiments and applied statistics. A good background in matrix methods is also a requirement (for example the course TMA4145 Linear Methods).
Academic content: Multivariate normal distribution, estimation and hypothesis testing for the multivariate normal distribution, multivariate linear regression, prinsipal components, factor analysis, disciminant analysis, classification and cluster analysis.
Teaching methods and activities: Ledtures, exercises, project/term paper. The exercises demand the use of a computer (computing programme R). The lectures may be given in English. Portfolio assessment is the basis for the grade awarded in the course. This portfolio comprises a written final examination 80% and the semester assignment 20%. The results for the constituent parts are to be given in %-points, while the grade for the whole portfolio (course grade) is given by the letter grading system. Retake of examination may be given as an oral examination.
Course materials: Will be announced at the start of the semester.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	80/100	C
EXCERCISES			20/100	

TMA4275 Lifetime Analysis

Lecturer: Professor Bo Henry Lindqvist
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course gives the theoretical foundation for stochastic modeling and statistical analysis of lifetime data, with emphasis on applications in reliability analysis and medicine. The student will through the mandatory exercises be able to use the theory on realistic data.
Recommended previous knowledge: Courses TMA4240/TMA4245 Statistics or equivalent. It will be an advantage to have taken one of the courses TPK4120 Industrial safety and reliability, TMA4260 Industrial statistics, and TMA4255 Design of experiments and applied statistical methods.
Academic content: Basic concepts in lifetime modelling. Censored observations. Nonparametric estimation and graphical plotting for lifetime data (Kaplan-Meier, Nelson-plot). Estimation and testing in parametric lifetime distributions. Analysis of lifetimes with covariates. (Cox-regression, accelerated lifetime testing). Modelling and analysis of recurrent events. Nonhomogeneous Poisson-processes. Nelson-Aalen estimators. Bayesian lifetime analysis.
Teaching methods and activities: Lectures and exercises with the use of a computer (MINITAB). The lectures may be given in English. Portfolio assessment is the basis for the grade awarded in the course. This portfolio comprises a written final examination 80% and selected parts of the exercises 20%. The results for the constituent parts are to be given in %-points, while the grade for the whole portfolio (course grade) is given by the letter grading system. Retake of examination may be given as an oral examination.
Course materials: Rausand and Høyland:. System Reliability Theory. Models, Statistical Methods and Applications. Wiley 2004. Notes about certain topics.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	80/100	B
EXCERCISES			20/100	

TMA4300 Modern Statistical Methods

Lecturer: Professor Håvard Rue
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: This subject gives an introduction to modern computer based techniques for statistical inference. The students will through the mandatory exercises be capable of applying the theory in simple situations.
Recommended previous knowledge: Subject TMA4240/TMA4245 Statistics. The subject require a mature understanding of statistics and we also recomend TMA4265 Stochastic Processes and TMA4270 Multivariate analysis.
Academic content: Classical methods for stochastic simulation, Markov chain Monte Carlo methods. Graphical models, networks and Bayesian inference. Bootstrapping, cross-validation and non-parametric methods. Classification.
Teaching methods and activities: Lectures and compulsory exercises on a computer. The lectures may be given in English. Portfolio assessment is the basis for the grade awarded in the course. This portfolio comprises a written final examination 60% and an exercise 40%. The results for the constituent parts are to be given in %-points, while the grade for the whole portfolio (course grade) is given by the letter grading system. Retake of examination may be given as an oral examination.
Course materials: Will be announced at the start of the course.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	07.06.2007	09.00	60/100	C
EXCERCISES			40/100	

TMA5100 Calculus 4K

Lecturer: NN
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To introduce the students to the theory of functions of a complex variable and the theory of Fourier series and integral transforms, and to make the students able to use these techniques to solve ordinary and partial differential equations.
Recommended previous knowledge: Mathematical subjects equivalent to 21 credits from engineering colleges or similar.
Academic content: Laplace transform and solving ordinary differential equations and integral equations. Fourier series, Fourier transform and solving partial differential equations, complex functions, complex integration, series expansions and residue calculus.
Teaching methods and activities: Lectures and exercises. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: E. Kreyszig: Advanced Engineering Mathematics, 8. ed., Wiley.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	100/100	C

Department of Marine Technology

TMR4115 Design Methods

Lecturer: Professor II Stein Ove Erikstad
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course will give a foundation for understanding and applying mathematical programming and operations research for decision support and optimization in relation to design of marine systems.
Recommended previous knowledge: The students should have basic knowledge about marine systems design.
Academic content: Design process modelling. Evaluating and selecting among alternative design solutions, utility theory. Design as optimization. Linear programming, interpreation of primal and dual variables. Analytical solution to non-linear problems. Heuristic methods applied on non-linear models, genetic algorithms. Basic decision theory. Network optimization. Deriving simplified models from complex problems using response surface methodology and analysis of variance. Software tools for optimization.
Teaching methods and activities: Learning is based on both ordinary classes and assignments. The assignments focus on applying methods using databased tools. The term paper will focus on the practical application of the models and methods covered in the course. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and exercises (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Hillier og Lieberman: Introduction to Operation Research. Lecture notes and papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	70/100	C
EXCERCISES			30/100	

TMR4120 Underwater Engineering, Basic Course

Lecturer: Førsteamanuensis Ludvig Karlsen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Obtain a basic understanding of the processes in the ocean and design, contruction and working principle of various underwater systems. The course forms the basis for more advanced courses in underwater technology.
Recommended previous knowledge: TMR4105 Marine Technique 1, TMR4105 Marine Technique 2 or Equivalent
Academic content: In the introduction ocean sea water composition and properties is dealt with, also with purpose to serve as basis for the understanding of sound transmission, light conditions and primary production in the oceans, and explains how this knowledge is applied in instruments for positioning, signal transfer, mapping, measurements and experimental samling. The main course content deals with systems for transport and operation in the ocean space as well as methods for calculation of the influence of the ocean current and vessel movement on hanging loads and ROVs. Also design, operation and evaluation of the properties of manned, remote controlled and autonomous systems are dealt with.
Teaching methods and activities: Lecture, practical training with ROV, a larger project work parallell with the lecture as group work. All group members will in principle get the same marks.
Course materials: Various text bokks, lecture notes and relevant available information on internet.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			75/100	
MIDTERM EXAMINATION			25/100	D

TMR4125 Building of Ships and Platforms

Lecturer: Professor Ola Westby
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project

Learning objectives: The main objective is to teach the common knowledge of marine building technology and focus on factors which are important to the cometitiveness.
Recommended previous knowledge: None.
Academic content: The course starts with identification of actors in building projects, i.e. shipyards, building companies, engineering companies, classification soc., authorities, ship owners, oil companies and vendors.
The course is an introduction to building of ships and platforms through the life cycle of projects. Management of building as well as the performing of the building with focus on technology is included. The lecturing gives an understanding of the building process, the building methods ond the design of ships and platforms. Principles and methods are explained for the purpose of reuse for new unknown constructions. Special attention is paid to factors which are important to the competitiveness of projects.
Teaching methods and activities: Lectures, excursions, exercises. The course is part of the MSc program and will be lecured in English when applied to this program. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: A textbook: Building of ships and platforms, on the internet edited by Ola Westby.
Hand outs.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.06.2007	15.00	50/100	D
EXCERCISES			50/100	

TMR4130 Risk Analysis and Safety Management of Maritime Transport

Lecturer: Professor Svein Kristiansen
Weekly hours: Spring: 2F+8Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Present the basic issues relating to the improvement of safety at sea. Give the theoretical and practical basis for risk analysis of maritime systems. Discuss central ideas on how safety can be improved through organization and management controls.
Recommended previous knowledge: Subject Marine design and machine knowledge, Basic Course, or equivalent.
Academic content: The risk concept. What is an accident? Risk picture. Accident statistics. Preventive and ameliorating measures. Safety mangament - monitoring of the risk level. Risk objectives and data. Statistical analysis of safety oriented decision alternatives. Maritime traffic models. Probability of grounding and collision. Risk analysis methods: Hazard analysis, FTA, ETA, FMECA, HazOp. Formal safety assessment (FSA). Cost-benefit analysis of safety measures. Analysis and

modelling of ship casualties. Benefit-cost analysis of controls. Analysis and modelling of ship accidents. Human reliability and error mechanisms. Catastrophe behaviour, evacuation and rescue. Training, drills and human-machine simulation. Regulation and official control of maritime safety. National and international control authorities. Safety and quality management. ISO standards. Auditing. Safety Case.
Teaching methods and activities: Lectures and assignments.
Course materials: Textbook: Kristiansen, S.: Maritime Transportation - Safety Management and Risk Analysis. Elsevier - Butterworth Heinemann, Amsterdam. ISBN 07506 59998.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TMR4135 Fishing Vessel and Workboat Design

Lecturer: Professor Anders Endal
Weekly hours: Spring: 2F+8Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course shall enable the students to design fishing vessel, workboats and small vessels with due regard for the boundary conditions and functional requirements governing their operations
Recommended previous knowledge: Basic knowledge of marine technology
Academic content: Basic fishery ecology, ocean environment, fisheries management, laws and regulations. Main principles for concept development and design of such vessels. The use of LCA, modelling and analyses of fishing operations as design tools. Fishing methods, catch handling methods,deck machinery systems for gearhandling and catch-handling. Principles and instrumentation for fish finding and navigation. Ergonomics and safety considerations in wheelhouse-, accommodation- and fishing system design. Methods for estimating forces from towed objects, fishing gear and lifting gear and their effect on safety and stability. Resistance and powering calculations for fishing vessels and workboats, operating profiles for machinery systems with highly variable loading. Design of such systems for minimum fuel consumption.
Teaching methods and activities: The course consists of two main parts:
1.Lectures/Informal, colloquial group based discussions 2. A team based vessel design project. Student groups/Lecturer introduce themes for discussions. Types of work boats to be discussed and guest lecturers to be invited decided in consultstion with the students.
Course materials: Lecture notes
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	09.06.2007	09.00	50/100	D
MIDTERM EXAMINATION			25/100	D
EXCERCISES			25/100	

TMR4140 Design of Marine Production Plants

Lecturer: Førsteamanuensis Ludvig Karlsen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students shall obtain the skill and basic knowledge to be able to design open sea fish farms as well as fish catching systems.
Recommended previous knowledge: TR4110 Marine design and machinery knowledge GK 1, or equivalent
Academic content: Course content: In the introductory part actual fish species, included their environmetal requirements, Governmental laws and regulations for farming in Norway and environmental conditions included coastal topography are delt with.
The main part deals with various types of open sea (net cage) farms, floating platforms, net volumes, current forces and volume deformation as well as achoring and net weighting. Also fish catching systems, both active and passive, are delt with in the course.
Teaching methods and activities: The course includes class lectures, exercises, project group work and excursions to commercial sea farms and/or farm equipment producers.
Course materials: L. Karlsen: Various lecture notes
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	23.05.2007	09.00	50/100	D
EXCERCISES			50/100	

TMR4145 Product Modelling and Design

Lecturer: Professor Ola Westby
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The main objective is that the students shall learn how to use CAD systems in design, product modelling and visualization.
Recommended previous knowledge: Fundamental knowledge in using CAD systems is profitable.
Academic content: Introduction on modelling functions etc. Commercial use of CAD. Presentation techniques. Standards for modelling.3D models.Conceptual and detailed design with CAD. Parametric design. Animation and related techniques as a means to design and presnetation of products. Discipline specific applications.Links to analysis. Virtual reality.
Problems solved by teams are supervised exercise in design.
Teaching methods and activities: Individual exercises and supervised teamwork complemented by lectures. Final presentation of teamwork.
Course materials: Textbooks, manuals and tutorials.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			75/100	
MIDTERM EXAMINATION			25/100	A

TMR4175 Marine Hydrodynamics and Structures, Basic Course 2

Lecturer: Professor Bernt Johan Leira
Weekly hours: Autumn: 12S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To make the students able to compute stresses and deformations in ships and marine structures due to still-water and wave-induced loads, and also to understand the load-carrying functionality of such structures
Recommended previous knowledge: Marine structural engineering from Technical High School, TMR4210 Marine hydrodynamics and structures, Basic course 1 or equivalent.
Academic content: The course deals with the load-carrying functionality, load-effect analysis and design of ships and marine structures. The following topics are addressed: Wave-induced loads and motions of ships. Analysis of shell- and plate-structures. Series solutions for plates. Energy methods for solution of plate buckling. Stress analysis of ships and marine
Teaching methods and activities: Mainly self-study.
Course materials: Compendiums
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	11.12.2006	09.00	70/100	D
MIDTERM EXAMINATION			30/100	C

TMR4185 Marine Dynamics

Lecturer: Professor Carl Martin Larsen, Professor Dag Myrhaug
Coordinator: Professor Carl Martin Larsen
Weekly hours: Spring: 12S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The principles and methods relevant to dynamic response of marine structures will be explained.
Recommended previous knowledge: Basic knowledge in dynamics at BSc/BEng-level or similar, TMR4210 Marine hydrodynamics and marine structures, basic course.
Academic content: One degree of freedom systems and modelling of continuous systems using generalised co-ordinates. Eigenfrequency-calculation of beams using the differential equation energy method. Calculation of forced response in time and frequency domain modal superposition. Response in ship-hill and motion of typical floating structures e.g. floaters, and tension leg platforms. Irregular waves and wave spectra, short-time and long-time statistics of waves. Transfer functions and response statistics. Separation of vortices. Vortex-induced vibrations. Anchor lines.
Teaching methods and activities: Lectures and exercises. Postponed/repeated exams may be oral.
Course materials: Lecture notes.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	70/100	C
MIDTERM EXAMINATION			30/100	C

TMR4190 Finite Element Methods in Structural Analysis

Lecturer: Professor Torgeir Moan
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Teach students to apply the theoretical foundations of the finite element method in modelling, analysis and interpreting the results, with applications to marine structures.
Recommended previous knowledge: Knowledge corresponding to TMR4105 Marine technology 1, TMR4165 Marine technology 2, TMR4245 Marine technology 3, TMR4210 Marine hydrodynamics and structural mechanics GK 1 og TMR4170 Marine hydrodynamics and structural mechanics GK 2.
Academic content: Energy principles for establishing stiffness relationships for beam - , plane stress - and plate bending problems. Global stiffness relationship achieved by element properties. Superelement and substructure techniques. Use of computer programs in finite element analysis. Examples of modelling of marine structures.
Teaching methods and activities: Lectures, exercises, including two mandatory computer exercises. The subject will be lectured in English every second year when international M.Sc. students take the subject. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and exercises (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: K. Bell: Matrix Methods (in Norwegian), Tapir, 1994; or equivalent textbook.
T. Moan: Finite Element Modelling and Analysis of Marine Structures, Department of Marine Technology, NTNU, September 2003.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	70/100	C
MIDTERM EXAMINATION			30/100	C

TMR4195 Design of Offshore Structures

Lecturer: Professor Torgeir Moan
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Provide the candidate with the knowledge and skills to carry out basic tasks regarding structural design and dimensioning of marine structures.
Recommended previous knowledge: Knowledge corresonding to TMR4105 Marine technology 1, TMR4165 Marine technology 2, TMR4245 Marine technology 3, TMR4210 Marine hydrodynamics and structural mechanics GK 1 og TMR4170 Marine hydrodynamics and structural mechanics GK 2.
Academic content: Serviceability and safety design criteria, including requirements to overall stability and strength as well as evacuation and escape. Overview of functional, environmental and accidental loads for marine structures, with an emphasis on wave-induced loads. Materials for marine structures. Limit state design checks. Alternative designs of facilities for the offshore oil and gas industry.
Teaching methods and activities: Lectures and exercises. This subject is taught in the international M.Sc.program every second year. Exercises and lectures are then conducted in English. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (60%) and exercises (40%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2007	09.00	60/100	C
EXCERCISES			40/100	

TMR4200 Fatigue and Fracture of Marine Structures

Lecturer: Professor Stig Berge
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, project

Learning objectives: The students shall learn and understand theory and methods for design of ships, offshore structures and other types of marine structures against fatigue and fracture, methods for operation and maintenance of load-carrying structures.
Recommended previous knowledge: Basic materials technology and mechanics of solids
Academic content: Linear-elastic and elastic-plastic fracture mechanics, materials characterisation, methods for defect assessment of structural components, failure analysis diagram. Cyclic loading and fatigue of metals, fracture mechanics analysis of fatigue, cumulative damage, stress corrosion cracking, corrosion fatigue, fatigue design methods. Materials for marine structures; steel, aluminium, titanium, composites, polymers. Strength properties with emphasis on fracture mechanics

properties. The main focus is on applications for marine structures, but the methods are generally applicable for most types of dynamically loaded structures like bridges, cranes, pressure vessels, pipelines, aircraft, rotating machinery, etc.
Teaching methods and activities: Lectures, exercises, lab demonstrations and a project. 70% of the exercises and the project must be accepted for admission to the final exam. The course is part of an international MSc education and is taught in English when needed. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and mid term exam (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Compendia, lecture notes, exercises, laboratory demonstrations.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	70/100	C
MIDTERM EXAMINATION			30/100	C

TMR4205 Buckling and Collapse of Marine Structures in Steel and Aluminium

Lecturer: Professor Jørgen Amdahl
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project work

Learning objectives: Obtain a fundamental understanding of the governing physical efects behind buckling and plastic collapse and acquire skills in the use of methods for analysis and practical design of marine strcures in steel and aluminium with respect to these failure modes.
Recommended previous knowledge: Courses TMR4165 Marine Technology 2 and TMR4210 Marine Hydrodynamics and Structures, Basic Course 1 or corresponding knowledge.
Academic content: Desig in the limit state of ultimate collapse, deign codes, guidelines (DnV; Norsok, Eurocode). Welding stresses in steel and aluminium structures. Effect of shape imperfections, welding stresses and soft zones on the resistance to buckling. Yield hinge theory and mechanism analysis of beams and frames. Incremetal plastic analysis. Interaction between bensding moment and axial force. Computer program for nonlinear analysis of frames and trussworks. Buckling of columns, beam-columns and franes. Buckling of plates in steel ansd lauminium subjected to uni-axial and multiple loads, including transvers pressure. Resistance of plate girders and box girders in post-buckling range. Buckling of stiffened shell strcutures.
Teaching methods and activities: Lectures and mandatory exercises. The subject is taught in the international M.Sc.program every second year. Exercises and lectures are then conducted in English. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%), mid term exam (15%) and exercises (15%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Lecture notes, exrecise. Text book: Ultimate load analysis of marine structures, T. H. Søreide, Tapir publishers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	07.06.2007	15.00	70/100	C
MIDTERM EXAMINATION			15/100	C
EXCERCISES			15/100	

TMR4210 Marine Hydrodynamics and Structures, Basic Course 1

Lecturer: Professor Bjørnar Pettersen
Weekly hours: Autumn: 4F+6Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Give the students basic knowledge in marine fluid dynamics so they can apply linear wave theory and calculate wave forces on fixed and floating structures, and calculate wave induced motions of floating bodies. The subject should provide basic understanding with respect to design of jacket platforms and floaters, skills in calculation of forces and stresses, and analysis of buckling for components in such designs.
Recommended previous knowledge: Topics TEP4110 Fluid Mechanics, TMR4105 Marine Technology 1, TMR4165 Marine Technology 2, TMR4245 Marine Technology 3 or similar.
Academic content: Basic potential flow and linear wave theory. Wave forces on fixed and floating structures. Wave induced motion of floating bodies. Buckling of beam-columns and frames. Design of jacket platforms and floaters and basic load effects for these structures. Design criteria and introduction to relevant rules and regulations.
Teaching methods and activities: Lectures and compulsory exercises. Laboratory demonstrations. Postponed/repeated exams may be oral.
Course materials: Lecture notes.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	75/100	C
MIDTERM EXAMINATION			25/100	C

TMR4215 Sea Loads

Lecturer: Professor Odd Magnus Faltinsen
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To generate physical understanding and to make use of simple methods for an early design stage, for marine operation planning or for checking practical computer results or model experiments.
Recommended previous knowledge: Subject Marine hydrodynamics, BC or similar. Knowledge about dynamics and stochastic description of waves and loads
Academic content: It is shown how to calulate and minimize motions, accelerations and wave loads on semisubmersibles and ships. Mean and slowly varying motions of moored structures in waves, wind and current. Slamming.
Teaching methods and activities: Lectures and compulsory exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (75%) and exercises (25%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: O.M.Faltinsen: Sea Loads on Ships and Offshore Structures, Cambridge University Press, 1990.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	75/100	D
EXCERCISES			25/100	

TMR4217 Hydrodynamics for High-Speed Marine Vehicles

Lecturer: Professor Odd Magnus Faltinsen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Give physical understanding that makes it possible for students to interprete theoretical and experimental hydrodynamic investigations, that can be used i design of high-speed vessels.
Recommended previous knowledge: TMR4215 Sea Loads.
Academic content: The course considers the three main categories of high-speed vessels, i.e.hull-supported, air-cushion supported and foil supported vessels. Hull-supported vessels are divided into semi-displacement and planing vessels. All hydrodyanmic aspects are discussed. This means resistance, trim, wash, propulsion, seakeeping, hydrodynamic stability and maneuvering. Links to automatic control and structural mechanics are emphasized.
Teaching methods and activities: Lectures and exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (75%) and exercises (25%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Faltinsen, O.M., 2005, Hydrodynamics of High-Speed Marine Vehicles, Cambridge University Press.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	31.05.2007	15.00	75/100	D
EXCERCISES			25/100	

TMR4220 Naval Hydrodynamics

Lecturer: Professor Sverre Steen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To make the students familiar with procedures for calculations of resistance, propulsion and evalution of manoeuvring and steering ability of high speed craft and conventional ships. To make the students familiar with selection and design of proper hull form, propulsion and manoeuvring systems.
Recommended previous knowledge: Topics TMR4165 Marine Technology 2 and TMR4245 Marine Technology 3 or similar. General fluid mechanics. Basic knowledge of resistance and propulsion of ships.
Academic content: Application of lifting line and lifting surface theory in the design of propulsors, rudders, foils etc. Application of theory and experimental methods in calculation of resistance and in calculation of hydrodynamical characteristics of waterjets, tunnel thrusters and rotatable thrusters. Propeller induced vibration and noise. Influence of fouling,

wind and waves on resistance and propulsion. Propulsor dynamics in waves. Horizontal stability and maneuverability characteristics of conventional ships.
Teaching methods and activities: Lectures and voluntary exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final exam (70%) and an oral mid term exam (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Knut Minsaas: Compendium Naval Hydrodynamics.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2007	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TMR4223 Marine Machinery

Lecturer: Professor Maurice F. White
Coordinator: Førsteamanuensis Eilif Pedersen
Weekly hours: Autumn: 12S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises, Project- Laboratory work

Learning objectives: This course are aimed to deepen the knowledge and understanding of marine machinery systems design and analysis.
Recommended previous knowledge: Marine technology 1-3
Academic content: Auxillary systems for ships and platforms, system understanding, design, performance analysis, control and installation. Thermal engineering basics - energy efficiency and systems. Cooling, refrigereation, airconditioning and steam systems. Introduction to machinery dynamics, vibration, vibration isolation and noise control.
Teaching methods and activities: Lectures, exercises and project work. Postponed/repeated exams may be oral.
Course materials: To be stated at semester start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	50/100	D
MIDTERM EXAMINATION			20/100	C
EXCERCISES			30/100	

TMR4225 Marine Operations

Lecturer: Professor II Tor Einar Berg
Coordinator: Professor II Finn Gunnar Nielsen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Provide insight in execution and modelling of marine operations. Enhance the understanding of which forces that are acting. Learn how to estimate forces, motions and regularity of marine operations in waves and current.
Recommended previous knowledge: Subjects Marine Structures, BC.
Academic content: Marine- and subsea operations related to installation and operation of offshore oil and gas fields are operations, oil recovery and regularity will be towing of structures. Further, issues related to design and operations of subsea vehicles are discussed. Main focus is on analysis of dynamic and hydrodynamic problems. Methods for estimating loads and responses in waves and current are discussed.
Teaching methods and activities: Lectures and exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and exercises (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: F.G. Nielsen: Lecture Notes. Marine Operations 2005 version.
T.E. Berg: Lecture Notes on Under Water Vehicles.
O.M. Faltinsen: Sea Loads on Ships and Offshore Structures, Cambridge University Press, 1990
Handouts
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.06.2007	09.00	70/100	C
EXCERCISES			30/100	

TMR4230 Oceanography

Lecturer: Professor Dag Myrhaug
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The emphasis will be on the physical understanding of phenomena contributing to the interaction between the atmosphere and ocean, and which also contribute to the motions in the ocean.
Recommended previous knowledge: Subject Marine hydrodynamics.
Academic content: Properties of seawater. Conservation equations. Equations of motion. Coriolos effect. Geostrophic current. Inertial current. Planetary boundary layer flow. Wind-induced current. Bottom currents. Circulation. Tides. Global and local wind description. Mean wind. Wind gust. Wave forecast. Surface waves. Wave refraction. Non-linear waves. Breaking waves. Wave-current interaction.
Teaching methods and activities: Lectures and exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final oral exam (70%) and mid term exam (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade.
Course materials: Myrhaug, D: Lecture notes on Wind. Waves. Current.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	19.05.2007	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TMR4235 Stochastic Theory of Sealoads

Lecturer: Professor II Sverre Kristian Haver
Coordinator: Professor Dag Myrhaug
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The principles and methods which are used to describe stochastic processes will be explained. The emphasis will be on the applications to sealoads and motions of marine systems, and to make the students able to use such principles and methods.
Recommended previous knowledge: Basic knowledge in statistics on BSc/BEng-level corresponding to TMA4240/ TMA4245 Statistics, TMR4210 Marine hydrodynamics and marine structures, basic course and TMR4180 Marine dynamics.
Academic content: Transformation of random variables. Monte Carlo simulation. Probability distributions for response. Parameter-estimation. Extreme-value statistics. Stochastic processes. Auto- and cross-correlation functions. Spectra and cross-spectra. Differentiation of stochastic processes. Excitation-response of stochastic processes. Equivalent linearization. Response-statistics.
Teaching methods and activities: Lectures and exercises. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and mid term exam (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: D.E. Newland: An introduction to random vibrations, spectral and wavelet analysis, 3rd edition, 1993. D. Myrhaug: Lecture notes. B. Leira: Lecture notes.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2006	09.00	70/100	C
MIDTERM EXAMINATION			30/100	C

TMR4240 Marine Control Systems

Lecturer: Professor Asgeir Johan Sørensen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Project works

Learning objectives: The course will give an introduction to design of control systems for dynamic positioning of ships and floaters, marine operations, marine automation and electrical power generation and distribution using maritime electrical installations on ships and floating marine structures.
Recommended previous knowledge: Control Engineering (TTK4105) or equals. It is recommended to study this course in parallel to (TTK4190) Guidance, Navigation and Control.
Academic content: The course focus on the design of control systems for various marine operations, motion control, positioning, manoeuvring, machinery systems and propulsion systems for ships and floating marine structures.
This includes dynamic positioning, thruster assisted position mooring, motion damping, crane control, machinery systems, propellers, thrusters, rudders, electrical power generation and distribution for maritime electrical installations. Application areas are shipping, offshore oil and gas, and aquaculture industries. Process knowledge including mathematical modelling is emphasized. Introduction to conventional linear monovariable (SISO) and multivariable (MIMO) control and observer designs (PID, LQG, Kalman filtering etc.) for marine applications will be given. Results from nonlinear state estimation and control, whereof passivity, feedback linearization, and Lyapunov analysis will be presented. It will also be given an overview of the implementation aspects with focus on signal processing. Aspects related to safety and performance of marine control systems, and authority and class requirements will be treated.

Teaching methods and activities: If needed, the lecture will be given on English. All written material is on English. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (60%), and exercises (40%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Lecture Notes: Marine Cybernetics: Modelling and Control, 5. ed. Department of Marine Technology.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.06.2007	09.00	60/100	D
EXCERCISES			40/100	

TMR4253 Marine Systems Design

Lecturer: Amanuensis Bjørn Oskar Sillerud
Coordinator: Professor II Kai Levander
Weekly hours: Autumn: 12S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The subject will give the students an introduction to preliminary design of displacement vessels. The students should also be able address the wider aspects of design such as mission analysis, requirements specification, concept development and evalutation.
Recommended previous knowledge: Subjects Marine technology 1, 2 and 3. Basic knowledge in marine technology
Academic content: Outline of the design process for displacement vessels: Main dimensions, weight, volumes, and cost on the basis of specified capacity and speed. Definition section area curve, lines sketch, subdivision, and control of stability, freeboard and floodable length. Application computer programs in design and analysis.
The aspects of the design process in greater depth: Problem solving, creativity, optimality and decision under uncertainty. Design based on systems analysis methods. These design aspects are demonstrated in design of a semi-submersible platform.
Teaching methods and activities: Lectures, exercises and project assignments. Understanding and ability to perform realistic marine systems design projects. Postponed/repeated exams may be oral.
Course materials: K. Levander: System Based Ship Design.
Stian Erichsen: Elements and Techniques of Marine Design.
Selected lecture notes and papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	50/100	D
MIDTERM EXAMINATION			20/100	D
EXCERCISES			30/100	

TMR4265 Operation Technology, Basic Course

Lecturer: Førsteamanuensis II Trond Michael Andersen, Professor Svein Kristiansen, Professor Magnus Rasmussen, Førsteamanuensis II Tom Anders Thorstensen
Coordinator: NN
Weekly hours: Spring: 12S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises and Project work

Learning objectives: This course will give the students basic knowledge and understanding of operation of marine systems, and factors influencing efficiency, safety, the environment and cost during the operation phase. Further, the course will give the students basic knowledge of strategies, systems and requierments for control and management of these factors.
Recommended previous knowledge: TMR4105 Marine Technology 1, TMR4165 Marine Technology 2, TMR4245 Marine Technology 3, and TMR4110 Marine design and machinery basic course, or equivalent knowledge compared to these mentioned courses.
Academic content: rief description of organisations and systems for the operation phase. Type of failure in equipment and machinery during operation, and the failure causes. The influence of these failures on efficiency, safety and the environment. Condition monitoring and inspection methods. The maintenance function. Condition-based maintenance. The RCM-consept and the statistical and probability teory base for this consept. Introduction to risk- and safety management and analysing methods.
Teaching methods and activities: Lectures, a laboratory ecercise and conventional exercises. Mandatory project work. The laboratory exercise is also mandatory. 75% of the exercises are requiered for admission to the final exam. The project work count 30% on the course grade. A midterm exam count 20% and the final exam 50%. Postponed/repeated exams may be oral.
Course materials: Lecture notes and handouts distributed at lectures and exercises.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.05.2007	09.00	50/100	A
MIDTERM EXAMINATION			20/100	A
EXCERCISES			30/100	

TMR4275 Modelling, Simulation and Analysis of Dynamic Systems

Lecturer: Førsteamanuensis Eilif Pedersen
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Make the student able to formulate mathematical models for simulation and analysis of physical dynamic systems. Practice use of modelling and simulations software for solving problems.
Recommended previous knowledge: TMR4110 Marine Design and Marine Engineering, Basic Course 1 or similar.
Academic content: This course gives an introduction to physical principles and laws that are used to describe the behaviour of physical systems and introduces methods for development of mathematical models for such systems. An energy based approaches to modelling of such systems are introduced using a graphical systematic and unified method used as both an representation and as a methodology for development of consistent proper mathematical models. From a set of generalised variables a set of basic elements are developed and used for modelling of mechanical, electric, hydraulic, thermal and composite systems. Introduction to numerical methods for solution of mathematical models in state space form, system analysis and numerical simulation are given. A broad selection of engineering systems will be selected for modelling and simulation.
Teaching methods and activities: Lectures, exercises, computer exercises and project work. All lectures will be in English. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%), mid term exam (25%) and exercises (25%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Pedersen, E., Engja, H., Mathematical Modelling and Simulation of Physical Systems, Lecture Notes, 2003.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	20.12.2006	15.00	50/100	D
MIDTERM EXAMINATION			25/100	D
EXCERCISES			25/100	

TMR4280 Internal Combustion Engines

Lecturer: Professor Harald Valland
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course will give the students basic introduction to internal combustion engines with emphasis on general features, power, energy utilization, mechanical and thermal loads, and exhaust emissions
Recommended previous knowledge: TEP4115 Thermodynamics 1 or similar.
Academic content: Overview of different types of internal combustion engines (ICE).
Piston engine construction and features.
Introduction to the working cycle of ICE with emphassi on factors that influence engine performance.
Gas exchange process and increasing engine power by means of turbocharging.
Engine fuels. Methods for fuel supply, ignition and combustion. Exhaust emissions, mechanisms for formation of pollutants, amounts of emissions.
Dynamic forces in the runniong gear. Mechanical and thermal loads.
Engine monitoring and control.
Teaching methods and activities: Lectures, exercises, project work, and laboratory exercises. The subject is included in the MSc programme for foreign students. Lecturing in English language, jointly for IVT and MSC students if selected. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%), mid term exam (25%) and exercises (25%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/ repeated exams may be oral.
Course materials: Specified at start of semester.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.06.2007	09.00	50/100	D
EXCERCISES			25/100	
MIDTERM EXAMINATION			25/100	C

TMR4290 Diesel-electric Propulsion Systems

Lecturer: Professor Lars Einar Norum
Coordinator: Professor Harald Valland
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Give the students an introduction to electrical engineering of importance for design and analysis of electrical systems on ships and platforms.The course should give the students an introduction to electrical power engineering which is important for management and coordination of design and analysis of electrical systems on ships and platforms.
Recommended previous knowledge: Subject Marine Design and Marine Engineering, Basic Course.
Academic content: Modul 1: Introduction to electrical engineering: Characteristics of electrical systems, power generation, distribution and voltage levels on maritime systems, moment and power characteristics of electrical motors etc. Modul 2: Electrical propulsion systems: Criteria for system design and optimal dimensioning of system and components, optimal operation. Introduction to basic methods for technical and economical analysis and evaluation of electrical systems. Safety requirements.
Teaching methods and activities: Lecture, exercises (calculation and data exercises) and mid-term test. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (70%) and mid-term test (30%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/repeated exams may be oral.
Course materials: Lecture notes.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2006	09.00	70/100	A
MIDTERM EXAMINATION			30/100	A

TMR4295 Design of Mechanical Systems

Lecturer: Professor Gunnar Härkegård, Professor Bernt Johan Leira
Coordinator: Professor Maurice F. White
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Introduction into design, function, layout and dimensioning of mechanical systems, with emphasis on component design and system function based on the interpretation and understanding of engineering drawings.
Recommended previous knowledge: All compulsory courses for the specialisation Marine Systems up to and including the 6th term.
Academic content: Basic technical drawing, understanding of outlines, cross-sections, projection, dimensions and tolerances. Use of computer aided design (CAD) for making detailed drawings of engineering components and system assembly plans. Introduction to machine design, in particular: rotating shafts (also dynamically loaded), dimensioning against fatigue, pressed joints, interference fits, gears, bearings, couplings, seals, and shaft loads.
Introduction into the use of finite element methods (FEM) for analysis of components with mechanical and thermal loading. Basic elements, system matrices, boundary conditions, calculation of stress, solutions, convergence, accuracy, heat transfer, temperature stress, evaluation or results.
Teaching methods and activities: Lectures, tutorials and exercises. Compulsory exercises where 2/3 must be approved before taking the final exam. One project that counts 40% of the final grade, covering CAD and machine design. Postponed/repeated exams may be oral.
Course materials: Textbooks and lecture notes.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	60/100	C
EXCERCISES			40/100	

TMR4700 Marine Structures, Specialization

Lecturer: Professor Jørgen Amdahl, Professor Stig Berge, Professor Carl Martin Larsen, Professor Bernt Johan Leira, Professor Torgeir Moan
Coordinator: Professor Bernt Johan Leira
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give the students experience in describing and solving problems of scientific or technical nature in relation to marine structures. The topic of the project work shall normally be a precursor for the main thesis, such that the specialisation study will extend over a complete univertsity year.

Recommended previous knowledge: All compulsory subject from 3. and 4. year curriculum for the specialisation study
Academic content: The specialisation study comprises 11.25 study points for the project and 11,25 study points for the subjects (3 subjects ´3,75). The most relevant subjects for this specialisation are:
Underwater Engineering(3,75 STP)
Dynamic analysis of marine structures (3,75 STP)
Structural Mechanics, Advanced course(3,75 STP)
Material technology and fracture mechanics (3,75 STP)
Hydroelasticity (3,75 STP)
Experimental methods in marine hydrodynamics (3,75 STP)
Numerical methods in marine hydrodynamics (3,75 STP)
Data based modelling and control of marine systems (3,75 STP)
Non-linear theory of motion
Kalman filtering and navigation
Servotechnology
The choice of subject will depend on type of specialization and shall be approved by the person responsible for the project. The following applies for the project: A subject related to the specialisation study is elaborated in one or more of the following ways: Literature study, analytical or numerical studies, development and application of a computer program, experimental investigations in the laboratory or full-scale. The results are to be presented in a report which is given a grade. It can also be relevant to present the content of the project orally for the institute and the other students. The subject of the project shall be selected within one of the following specialisations: Marine structural engineering/ Marine hydro dynamics/ Marine cybernetics. More detailed information will be given separately.
Teaching methods and activities: For the project: Guidance during the study, independent work with problem solving and reporting. The exam in the subjects shall only be oral if the subjects do not consist solely of laboratory work.
Course materials: For the project: Given by the advisor.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	50/100	D
EXCERCISES			50/100	

TMR4705 Marine Systems, Specialization

Coordinator: Professor Svein Kristiansen
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TMR5180 Control Engineering and Linear System Theory

Lecturer: NN
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Introduction to basics in control engineering.
Recommended previous knowledge: Mathematics: Laplace, Fourier.
Academic content: Linear system theory, frequency analysis, stability analysis, PID controller design, observer design based on Kalman filter, design of multivariable controllers like LQG, LTR, Hinf and H2.
Teaching methods and activities: Lectures and compulsory exercises. Midterm test. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: International text book (tbd).
Assessment: Written/Exercises/Midterm Examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	50/100	D
EXCERCISES			25/100	
MIDTERM EXAMINATION			25/100	D

TMR5230 Nautical Science, Basic Course

Lecturer: Professor Egil Pedersen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To provide a basic knowledge in maritime technology with emphasis on navigational safety at sea, operational efficiency of nautical operations and the importance of a link between developers and end-users of nautical systems.
Recommended previous knowledge: None.
Academic content: Collision and grounding avoidance at sea: ARPA, AIS, ECDIS/ECS systems, derivation of DCPA and TCPA, speed-aspect ratio, UKC management. Shipboard weather routing: Isochrone method for stochastic/deterministic minimum time/fuel routing; formulation of optimization problem, methods for solving, algorithms. Astronomic navigation: Formulation and solution of the celestial positioning problem without dead reckoning nor GMT. Environmental Stress (ES) model for evaluation of ship-handling difficulties in congested and topographically restricted waterways: Principle, subjective stress values, applications. Cable mechanics with nautical applications: Inelastic cable line equations, single and spread mooring systems, case studies. Quality control in marine navigation.
Teaching methods and activities: Lectures and compulsory exercises. Case studies. A project exercise will count 30 % in the grading.
Course materials: Compendium, lecture notes, technical/scientific papers.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	18.05.2007	09.00	70/100	D
EXCERCISES			30/100	

TMR5240 Nautical Science, Advanced Course

Lecturer: Professor Egil Pedersen
Weekly hours: Autumn: 3F+6Ø+3S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Utilize approximations and simplified methods for critical assessment of navigational safety at sea and evaluation of operational efficiency of nautical operations.
Recommended previous knowledge: TMR5230 Nautical Science, Basic Course.
Academic content: Errors in ARPA system: Modelling and analysis of the plotting performance due to errors in the pointing targets. Collision avoidance functionality on Electronic Chart System: Formulation of collision problem, exact collision danger regions in true motion display, simulator experiments. Advanced shipboard weather routing. Operational aspects in marine seismic surveying: Principles, survey methods, interaction effects in multi-cable towing systems, case studies. Ship-ship interaction in lightering and replenishment operations at sea. Advanced position and quality control methods in offshore operations.
Teaching methods and activities: Lectures and compulsory exercises. Case studies. A project exercise will count 30 % in the grading.
Course materials: Compendium, lecture notes, technical/scientific papers.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	09.12.2006	09.00	70/100	D
EXCERCISES			30/100	

TMR5250 Nautical Science, Project

Lecturer: Professor Egil Pedersen
Weekly hours: Autumn: 12Ø = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Introductory and preparatory studies for thesis work within the field of maritime technology.
Recommended previous knowledge: Various subjects within the field of maritime technology, dependent on the topic of the thesis.
Academic content: Studying necessary literature references and working out a plan of progress for the project work.
Teaching methods and activities: Supervised project.
Course materials: Not decided.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TMR5260 Nautical Science, Spesialization Course

Lecturer: Professor Egil Pedersen
Weekly hours: Autumn: 2F+8Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the topic of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc Programme in Nautical Science.
Academic content: Two topics selected from a list presented for the students in connection with the thesis work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes, technical/scientific papers.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	100/100	D

Department of Materials Technology

TMT4150 Refractories

Lecturer: Førsteamanuensis Kjell Wiik
Weekly hours: Spring: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Project work

Learning objectives: Establish a basic tool for the choice of refractory materials for a given process.
Recommended previous knowledge: Knowledge of chemical thermodynamics and phase diagrams are an advantage.
Academic content: Methods for manufacturing refractory bricks, refractory masses and carbon based materials. Thermal, and thermomechanical properties. Structure, chemical composition and mineral composition for the most common and important refractory materials. Thermal-insulating refractories. Chemical attack on refractory materials. Thermal shock resistance.
Teaching methods and activities: Lectures and written exercises. Final grade in the course is based on portfolio assessment. The portfolio includes written final examination (75%) and a project work (25%). The project work will be combined with an excursion.
The evaluation of the different parts is given in %points while the final grade for the whole folder is given by a letter grade. Lectures are given in English if there are students from the International master courses in Light metal production. For authum examination written final examination can be replaced with oral examination.
Course materials: "Refractories Handbook", Published by The Technical Association of Refractories, Japan, (June 1998). Various articles and exercises.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	75/100	C
EXCERCISES			25/100	

TMT4155 Heterogeneous Equilibria and Phase Diagrams

Lecturer: Professor Tor Grande
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The subject aims to give the students knowledge in chemical thermodynamics applied on heterogeneous phase equilibria including the effect of surfaces and interfaces. Application of phase diagrams in materials science and engineering will be in focus, and the calculation of phase diagrams from thermodynamic data and solution models are also included.
Recommended previous knowledge: Knowledge equivalent to TMT4275, Thermodynamics and Phasediagrams, TKJ4160, Physical Chemistry or Chapters 1-7 in Gaskell, D. R: 'Introduction to the Themodynamics of Materials', 4. edition, Taylor & Francis (2003).
Academic content: Short repetition of the 1., 2., and 3. law of thermodynamics. Phase transitions. The thermodynamics of solutions with emphasis on inorganic and metallic systems. Gibbs Phase law applied on liquid/solid, gas/solid and solid/solid phase equilibria. Phase diagrams for 1, 2, 3 and multi component systems with emphasis on systems of relevance for important metallurgical systems and inorganic materials. Phase stability and thermodynamics of surfaces and interfaces. The application of commercial thermodynamic computer programs.
Teaching methods and activities: Lectures including written exercises, some which includes the use of commercial thermodynamic software.
Voluntary examinations during the semester will be given. Lectures are given in English. If there is a re-sit examination, the examination form may be changed from written to oral.

Course materials: Svein Stølen and Tor Grande, Thermodynamics of Materials, John Wiley & sons, Ltd (2004). Lecture notes and exercises.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.12.2006	09.00	80/100	C
MIDTERM EXAMINATION			20/100	C

TMT4165 Materials- and Electro Chemistry, Project Work

Lecturer: Førsteamanuensis Kjell Wiik
Weekly hours: Spring: 2F+6Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Pass/Fail Compulsory assignments: None

Learning objectives: The objective is to give the students a wide introduction to the experimental techniques, relevant both to electro- and materials chemistry.
Recommended previous knowledge: None.
Academic content: Laboratory furnaces, measurement and control of temperature. Vacuum techniques and work in inert atmosphere. Working techniques in electro- and inorganic chemistry. Synthesis of inorganic materials. Demonstration of several measuring- and analysis methods, both theoretical and practical. Thermal analysis, X-ray diffraction, electron microscopy and optical microscopy, microanalysis and FTIR spectroscopy. Voltametry, current step,reference electrodes, potentiostat, impedance analysis and transient methods.
Teaching methods and activities: The students are guided through a number of experimental methods and techniques, essential for the reasearch activites at the department. A 7-weeks assignment will be carried out by the students and presented the end of the semester. Lectures are given in English on demand.
Course materials: Compendium.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TMT4185 Materials Science and Engineering

Lecturer: Professor Lars Arnberg, Professor Jarle Hjelen
Coordinator: Professor Jarle Hjelen
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Excercises, Laboratory work

Learning objectives: The main objective with this subject is to give a short introduction of the behaviour of various types of materials (metals, ceramics, polymers)and to discuss this in terms of their fundamental physical/chemical properties. Mechanical strength, toughness and corrosion are some key issues.
Recommended previous knowledge: Basic knowledge in chemistry.
Academic content: Structures, defects and dislocations in solids. Transport properties (diffusion), mechanical properties (elasticity, deformation, strength), phase equilibria (phase diagrams), phase transformations, electrical properties. Basic principles of corrosion are discussed. Various materials are discussed, like iron/iron alloys, ceramics, polymers and composites.
Teaching methods and activities: Lectures and cumpulsory exercises. In addition to conventional lectures and exercises, a loboratory exercise is included in the end of the semester. Lectures are given in English if there are students from the International master courses in Light metal production. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: William D. Callister Jr.: Materials Science and Engineering, An Introduction, 7. ed., John Wiley og Sons Inc, 2002.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	12.12.2006	09.00	100/100	D

TMT4220 Mechanical Properties of Engineering Materials 1

Lecturer: Professor Erik Aasmund Nes, Førsteamanuensis Nils Petter Vedvik
Coordinator: Professor Erik Aasmund Nes
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Excercises

Learning objectives: The subject aims to give an introduction to the basic strengthening mechanisms of industrial important materials, emphasizing metals and polymers.

Recommended previous knowledge: TMT4170 Materials Technology 1 and TMT4175 Materials Technology 2, alternatively TMM4100 Materials Technology 1 or TMM4140 Materials Technology 2.
Academic content: The subject starts with a review of experimental techniques for characterisation of mechanical properties, where the main focus is on the simple tensile test. Next the basic mechanisms of flow phenomena and deformation hardening in metallic materials and polymers are treated. Based on simple dislocation models the relations between microstructure and mechanical properties of metals are considered. For the case of polymers the basic mechanical models for visco-plasticity and rubber-plasticity are related to various microstructures.
Teaching methods and activities: Lectures and exercises. At delayed exams (continuation exam) the written examination may be replaced by an oral examination
Course materials: G.E. Dieter: Mechanical Metallurgy. Additional printed notes and the lectures (notes).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	09.00	100/100	D

TMT4295 Electrolytic Processes

Lecturer: Professor Geir Martin Haarberg
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The contents of the course should give a basic understanding of the industrial electrolyses processes in Norway.
Recommended previous knowledge: TMT4250 Electrochemistry, basic course or equivalent knowledge.
Academic content: Basic theory and background for industrial electrolysis; including heat balance, cell design, electrode reactions, overvoltage and electrode materials. Comprehensive treatment of molten salts as electrolytes, including emf cells and metal solubility. Special treatment of industrial processes of importance for Norway;
- chlor-alkali and chlorate
- zinc
- nickel, copper, cobalt
- electroplating
- aluminium and magnesium
- refining of aluminium

Teaching methods and activities: Lectures and problem solving. Lectures are given in English if there are students from the International master courses in Light metal production. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	100/100	D

TMT4325 Refining and Recycling of Metals

Lecturer: Professor Lifeng Zhang
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Excerises

Learning objectives: To provide a theortical fundamentals and techniques in the field of refining. To bridge extractive metallurgy and casting. To connect mechanical properties, qualities to the refining and recycling of metals. To emphasize the recycling of metals.
Recommended previous knowledge: Basic chemistry and mathematics.
Academic content: The subject gives an overview of the origin of inclusions and impurities elements in metals. An introduction to basic thermodynamics and kinetics for the refining and recycling of metals is presented. State of art in the refining and recycling (remelting) of aluminium, silicon, magnesium and steel are treated. Fundamentals of Transport Phenomena during refining and recycling of metals. Fluid flow related phenomena during refining and recycling of metals.
Teaching methods and activities: Lectures, exercises and projects. Water modell and hot metal experiments. Final grade in the course is based on portfolio assessment. The portfolio includes written final examination (50%), one semester test counting 30% and projects counting 20%. The evaluation of the different parts is given in %points while the final grade for the whole folder is given by a letter grade. For authum examination written final examination can be replaced with oral examination.
Course materials: Engh, T. A., "Principles of Metal Refining", Oxford University Press, 1992.
R. Byron Bird, Warren E. Stewart, Edwin N. Lightfoot, "Transport Phenomena", Second Edition, ISBN:0471410772

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	05.12.2006	15.00	50/100	D
MIDTERM EXAMINATION			30/100	D
EXCERCISES			20/100	

TMT5730 Process Metallurgy and Electrolysis, Specialization

Lecturer: Professor Trygve Foosnæs
Weekly hours: Autumn: 2F+26Ø+8S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To provide specialization in selected parts of the students field and to provide training in oral and written communication.
Recommended previous knowledge: The subject is part of the program for chemistry students with specialization in Inorganic Chemistry.
Academic content: Project work (15Cr) and a supporting subject module (7,5Cr). The project work will in general be experimental but may also be of a more theoretical character. The project work will be part of the sections ongoing research work. Systematic work within a field is emphasized as well as work to acquire detailed knowledge through literature studies and practical work. Subject modules are chosen from the following.
Thermodynamics of Molten Salts (7,5Cr)
Electrolysis of Light Metals (7,5Cr).
Possible subject combinations depends on the students other choices. In principle subjects may be chosen from other lines of specialization at the Faculty. The experimental/theoretical work is reported in a formal report which will be evaluated
Teaching methods and activities: The project module is carried out under supervision of one of the Institutes professors. The teaching in the subject module is lectures or colloquia, seminars and literature studies with active student participation. The project work weighs 2/3 in the final grade.
Industry Seminars: In order to supplement the theoretical courses with an update on current industrial methods and practices, Industry Seminars will be arranged. The seminars will be led by company specialists and also include excursions to reduction, cast house and carbon plants.
Course materials: Selected parts of relevant textbooks and literature articles.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

Department of Product Design Engineering

TPD5100 Ecodesign, Advanced Course

Lecturer: Førsteamanuensis Johannes Sigurjonsson
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments and group project

Learning objectives: This course presents the design function as a strategic tool to develop, design and implement industrial ecological systems, products and services. Industrial ecology is found as a promising concept in sustainable development. This course gives the students theory, methodological tools and practical case studies in how to accomplish change through the means of sustainable values in design processes.
Recommended previous knowledge: Basic knowledge of product development (Bachelor's degree in related subjects).
The course is required in the Master of industrial ecology; profile: Strategic design of product systems.
The course is taught in English. Please see the prerequisits to enter the Master programme of Industrial Ecology.
Academic content: This course provides detailed understanding of the role of design in an industrial ecological context. The course will have a specific focus on the interdependency between the business profile and the design activity. Strategic use of design is presented to promote sustainable development in a local as well as a global perspective. Design strategies are discussed as answers to chosen values for this type of development. This distinguishes strategic design from design strategies.
Issues of concern in the lectures and assignments:
-Design discourse concerning material and technological choices within strategies of "weak" and "strong" sustainability (Huesman 2003)
-The latest news within sustainable economy, business and network organisation
-The Factor X concept
-Scenario building in strategic work as a method to define long term framework for design decisions.
-Individual user needs and common welfare in a sustainable perspective.
-Human behaviour as an explicit and implicit impact on the environment.

-User-centered design solutions as a sustainability strategy and source to innovative solutions
These aspects will be both qualitatively and quantitatively placed in context with product and system design, and evaluated as guidelines for design of new product and system solutions.
Teaching methods and activities: The students will follow the lectures in Ecodesign TPD4145, however, additional lectures are given to the master students as well as specific assignments. Guestlecturers will be invited for specific detailing in some of the themes.
Grading: individual written exam 60%, group project and assignments 40%. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Compendium and lectures.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	07.06.2007	09.00	60/100	A
EXCERCISES			40/100	

Department of Petroleum Engineering and Applied Geophysics

TPG4120 Engineering and Environmental Geophysics

Lecturer: Professor Ole Bernt Lile
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Applications of geophysical methods for mapping the underground for technical purposes, groundwater, soil mechanical problems and for environmental purposes. Mapping overburden sediments, quality of rock, ground water, soil and water contamination, etc.
Recommended previous knowledge: Course TPG4100 Physics and geophysics or corresponding basic course in Applied Geophysics.
Academic content: Electrical methods. Resistivity (RP). Profiling. Vertical electrical sounding (VES). EM methods (VLF). Radar (GPR). Refraction seismics. Reflection seismics. Nuclear/Proton magnetic resonance (NMR, PMR). Logging methods.
Teaching methods and activities: Project work (PBL). Interpretation of refraction seismics. Demonstration in field. Lectures. Exercises count for 50% of the final grade. The course will be held in English if international masterstudents attend.
Course materials: John M. Reynolds: An Introduction to Applied and Environmental Geophysics, Wiley, or Telford, Geldart, Sheriff: Applied Geophysics, Cambridge. Course notes. NGU-reports.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	31.05.2007	09.00	50/100	D
EXCERCISES			50/100	

TPG4125 Seismic Wave Propagation

Lecturer: Førsteamanuensis Egil Tjåland
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject will give an overview and a theoretical understanding of how seismic waves propagate in the earth, with emphasize on the application of reflection seismics for hydrocarbon exploration.
Recommended previous knowledge: Course TPG4100 Physics and Geophysics.
Academic content: Wave equation and wave propagation. One-dimensional wave propagation. Elasticity theory. P- and S-waves. Acoustic Impedance Reflection and Transmission ofplane waves. Dsorption. Diffraction. Geometrical spreading. Ray-tracing. Finite difference modelling. Geometry of wave paths. Traveltime approximations and traveltime corrections. Multiple reflections. Seismic noise. Interpretation of velocity analysis.
Teaching methods and activities: Lectures, field courses and exercises. PBL. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: Sheriff and Geldart: Exploration Seismology, Cambridge.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	D

TPG4130 Seismic Interpretation

Lecturer: Førsteamanuensis Egil Tjåland
Weekly hours: Spring: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject will give an overview in advanced interpretation and modelling of reflection seismic data using state-of-the-art computer applications.
Recommended previous knowledge: Course TPG4125 Seismic waves is recommended.
Academic content: Interpretation of two and three dimensional data on graphical work station. Generation of seismic time contour maps. Depth conversion of seismic time map (both from stacked sections and time migrated sections). Inversion of seismic data after stack. Three dimensional seismic modelling using ray-tracing. Use of seismic modelling to plan seismic data acquisition.
Teaching methods and activities: Lectures and exercises on work station. Excercises count for 50% of the final grade. PBL.
Course materials: Compendiums.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	23.05.2007	09.00	50/100	D
EXCERCISES			50/100	

TPG4145 Reservoir Fluids and Flow

Lecturer: Professor Curtis Hays Whitson
Weekly hours: Autumn: 4F+6Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students should learn to apply the fundamentals of flow and phase behavior in petroleum reservoirs through example applications. Emphasis is made to link the interaction of fluid flow and phase behavior, and its impact on well and reservoir performance.
Recommended previous knowledge: None.
Academic content: The PVT part describes reservoir fluid properties, hydrocarbon phase behavior, PVT lab tests, and use of PVT data in reservoir calculations. The flow part of the course treats single-well behavior for steady state condition of gas and oil wells, as well as material balance calculation.
Teaching methods and activities: Lectures, exercises and project work. Exercises count for 40% of the final grade. Project work, PBL. Lectures are held in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Parts of Phase Behaviour SPE monograph (Whitson and Brule). Distributed notes and articles. E-notes on the internet.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	60/100	C
EXCERCISES			40/100	

TPG4150 Reservoir Recovery Techniques

Lecturer: Professor Jon Kleppe
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course aims at giving the students extensive knowledge of physical parameters, behavior, principles and methods related to recovery of oil and gas from reservoirs.
Recommended previous knowledge: Recommended background is passed TPG4112/TPG4110 Geomechanics and Flow in Porous Media and TPG4115 Reservoir Properties, or similar.
Academic content: The course addresses internal and external energy sources for reservoir production, and analysis of their influence on recovery of oil and gas from the various types of reservoirs. Topics: Oil, gas and condensate reservoir systems; microscopic and macroscopic displacement efficiency; natural drive mechanisms; injection of water and gas; material balance analysis; flow equations; simplified recovery estimation methods.
Teaching methods and activities: Lectures, obligatory exercises and group project. Folder evaluation will be basis for grade, and includes final exam (60%) and exercises/group work (40%). Each element is %-based, while final grade is letter-based. The lectures are in English. Retake exams may be oral.
Course materials: Course material will be given at semester start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	60/100	D
EXCERCISES			40/100	

TPG4160 Reservoir Simulation

Lecturer: Professor Jon Kleppe
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course aims at giving the students basic knowledge of numerical simulation of fluid flow in petroleum reservoirs.
Recommended previous knowledge: Recommended background is passed TPG4112/TPG41110 Geomechanics an Flow in Porous Media, TPG4115 Reservoir Properties and TPG4160 Reservoir Recovery Techniques, or similar.
Academic content: The course partial differential equations for one-phase and multi-phase flow in porous materials, and numerical methods for solving these. Topics: Summary of rock and fluid properties; derivation of PDE's; numerical solution of PDE's using finite differences; methods for solving linear and non-linear equations; discussion of different types of reservoir simulation methods; practical sides of reservoir simulation applications.
Teaching methods and activities: Lectures, obligatory exercises and group project. Folder evaluation will be basis for grade, and includes final exam (60%) and exercises/group work (40%). Each element is %-based, while final grade is letter-based. The lectures are in English. Retake exams may be oral.
Course materials: Course material will be given at semester start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2007	09.00	60/100	D
EXCERCISES			40/100	

TPG4170 Reservoir Seismics

Lecturer: Professor Rune Martin Holt, Professor Bjørn Ursin
Coordinator: Professor Bjørn Ursin
Weekly hours: Spring: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The topic shall give the students an understanding of rock physics and seismic methods used in reservoir geology and reservoir description. The exercises shall make the students able to do quantitative interpretation of seismic data.
Recommended previous knowledge: Course TPG4125 Seismic Waves.
Academic content: P- and S-waves in isotropic and anisotropic rocks. Principles for the measurement of acoustic properties in the laboratory. Simple rock physics models, mainly based on the Biot-Gassmann poro-elastic theory and critical porosity. Observed and modelled relations between seismic velocities and porosity, lithology, fluid saturation and mechanical stress/pore pressure. Seismic amplitude as a function of offset (AVO) and angle (AVA). Inversion of seismic data. Reservoir monitoring using repeated seismic measurements. Ocean bottom seismics.
Teaching methods and activities: Lectures and exercises. The lectures will be held in English if international masterstudents attend. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: Compendiums and articles.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.06.2007	09.00	100/100	D

TPG4177 Carbonate Reservoir Characterization

Lecturer: Amanuensis Helge Langeland, Professor Mai Britt E. Mørk
Coordinator: Amanuensis Helge Langeland
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Give an overview of basic terminology and concepts of carbonate rocks in order to understand the geology and the use seismics, petrophysics, reservoir engineering and well testing in the interpretation of carbonate reservoirs.
Recommended previous knowledge: Basic knowledge of geology and petrophysics.
Academic content: Carbonate reservoirs are considered to be the most significant source of hydrocarbon production for this century. This course is offered to provide an introduction to carbonate reservoir evaluation through use of academic and industry course material. The following subjects will be covered in the course: Basic terminology and concepts. Necessary terminology and concepts will be taught through lectures and self study assignments. This material will be focused to form a foundation for the reminder of the course. A variety of contrasting carbonate reservoirs will be used to demonstrate the importance of integrating subsurface geoscience disciplines in effective reservoir management. The integration of geology and integration will be stressed through lecture and self-study assignments. A review session will be provided to place the course into a wider context.

Teaching methods and activities: Practical case studies. Practical data sets will be provided for class and self study to teach the methods of "how to evaluate a carbonate reservoir". Assignments writing essays. Assignments and tests in the semester will count 30% on the exam grade. On retake of exam, an oral exam may be given.
Course materials: Relevant reference material will be provided during the course. A good basic background overview is found in: Scholle, P., A. Bebout, D.G, and Moore, C.H., eds: Carbonate depositional environments. American Association of Petroleum Geologists, Memoir 33.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TPG4180 Petrophysics, Interpretation of Well Data, Advanced Course

Lecturer: Professor II Terje Eidesmo, Professor Rune Martin Holt, Amanuensis Helge Langeland
Coordinator: Amanuensis Helge Langeland
Weekly hours: Spring: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Give a deeper understanding of data from boreholes, measurement methods used in boreholes, the information potential of these data and use in integrated evaluation of reservoirs.
Recommended previous knowledge: The course builds on course TPG4175 Petrophysics BC, TPG5120 Petrophysics BC or similar knowledge.
Academic content: The course focuses on selected topics from well data acquisition methods and the interpretation of these data, extending the concepts taught in the basic course in petrophysics. There will be project exercises connected to the Gullfaks database. Integration with other data types. Basic petrophysical relations and points of view. Radiometric methods in open and cased boreholes: Spectrometry - natural and induced, neutron lifetime logging (saturation behind cases), mud logging. Nuclear magnetic resonance, NMR. Properties of clay and shale. Water saturation models in shaly formations. Uses of core data. Pressure measurements. Acoustic and mechanical rock properties. Properties of carbonates.
Teaching methods and activities: Lectures, obligatory exercises, well data analysis software laboratory. Project based learning methods (PBL) and group work is used. The course is given in English when foreign students are attending. Semester test will count 30% on the exam grade. The exam can be changed from written to oral exam at the postponed exam.
Course materials: Articles, lecture notes and other relevant literature.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2007	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TPG4185 Formation Mechanics

Lecturer: Professor Rune Martin Holt
Weekly hours: Autumn: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students shall have a basic understanding of how stresses are changed as a result of petroleum production, and how these changes influence recovery and 4D seismics, plus stability during drilling and production. The students shall be able to perform computations of reservoir compaction and surface subsidence, mud weight limits for stable drilling, critical drawdown for initiation of sand production and estimated sand mass. The students shall have an overview of fundamentals and applications of hydraulic fracturing.
Recommended previous knowledge: Basis in mechanics.
Academic content: Reservoir geomechanics; Introduction to poroelasticity theory. Reservoir compaction, linear elastic model and inelastic effects. Surface subsidence. Stress evolution during production. Compaction as a drive mechanism. Stress effects on porosity and permeability. Coupled reservoir simulation. Link to 4D-seismics.
Borehole stability: Diagnostics. Critical mud weight limits to prevent hole collapse and mud losses. Effects of temperature and mud composition on borehole stability. Stability of deviated and horizontal holes. Effects of plasticity. Modelling of borehole stability.
Sand and particle production: Basic mechanisms. Sand control. Sand predition. Volumetric sand production.
Hydraulic fracturing: Initiation and growth of hydraulic fractures. Thermal fracturing during water injection. Use of fracturing during simulation, for stress determination, and for waste storage.
Teaching methods and activities: Lectures and exercises. PBL. Students will accomplish a semester project and present the results oral and in writing. This work counts for 25% of the final grade. The lectures are held in English if international masterstudents attend. Retake exams may be oral.
Course materials: Will be given at semester start.

Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	20.12.2006	09.00	75/100	B
EXCERCISES			25/100	

TPG4190 Seismic Data Acquisition and Processing

Lecturer: Professor Martin Landrø
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course gives an introduction to how huge amounts of seismic data are handled and processed.
Recommended previous knowledge: Courses TPG4125 Seismic Waves and TPG4165 Geophysical Signal Analysis.
Academic content: Seismic data acquisition. Seismic sources and receivers. Seismic arrays. Spatial sampling. Deconvolution. Velocity analysis and stacking. Traveltime equations. Two-dimensional filtering. Dip moveout. Wave equation migration. 3D seismic and VSP.
Teaching methods and activities: Lectures. Exercises in datalab. Lessons are based on project, where the project consists of processing a seismic data set. The project work counts for 40% of the final grade. The lectures are held in English if international masterstudents attend. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Ö. Yilmaz: Seismic data processing, SEG, Tulsa. Compendiums.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	60/100	D
EXCERCISES			40/100	

TPG4195 Gravimetry and Magnetometry

Lecturer: Professor II Jan Reidar Skilbrei
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The topic will give knowledge on modern techniques for processing and interpretation of gravimetric and magnetic data. Exercises include processing, map production, forward and inverse modelling and interpretation using Euler Deconvolution (Geosoft PC software is used).
Recommended previous knowledge: Course TPG4100 Physics and Geophysics or corresponding previous knowledge.
Academic content: Potential field theory. Instrumentation. Gravity and magnetic measurements, processing, and image analysis. Map production. Interpretation of potential field data, including Fourier analysis, regional-residual analysis, Autocorrelation, 3D Euler Deconvolution. Petrophysical properties of rocks. Interpretation using GIS, and modern software including forward modelling of potential fields with constraints taken from geology and seismic data. Data availability (including internet data bases).
Teaching methods and activities: Lectures and exercises. Exercises are mandatory.
Course materials: M. B. Dobrin and C.H. Savit: Introduction to Geophysical Prospecting, 4th ed., McGraw-Hill Book Company, 1988.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	12.12.2006	09.00	100/100	D

TPG4205 Drilling Techniques Pressure Control

Lecturer: Førsteamanuensis Pål Skalle
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Provide a summary over the most important safety elements that constitute a drilling programme; evaluations and initiatives to avoid or solve problems.
Recommended previous knowledge: Basic topics in drilling.
Academic content: Pressure in sedimentary formations, prediction or pore and fracture pressure, setting and cementation of casing, conventional pressure control (detection of unstable hole, well shut-in, killing procedures), mud transport of free gas and gas in solution, security aspects concerning drilling in deep water (cold environment, lowfracture gradients, high kick-frequency, hydrate formation, shallow gas and water currents).
Teaching methods and activities: Lectures and PBL-group work. Port folio evaluation gives the basis for final grade; written exam 50%, exercises 20%, midterm exam 30%. Results are presented by %, final grade by letter grade. The lectures will be held

in English if international masterstudents attend. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: SPE book: Applied Drilling Engineering. Compendium.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.05.2007	09.00	50/100	D
EXCERCISES			20/100	
MIDTERM EXAMINATION			30/100	D

TPG4215 High Deviation Drilling

Lecturer: Professor Arild Rødland
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The topic gives an introduction to the methods used for high deviation and horizontal drilling, identifies conditions which are of significant importance and gives an insight into calculations which are necessary for planning and accomplishment of such boreholes.
Recommended previous knowledge: Basics in Drilling Engineering.
Academic content: Deviation drilling, history and background. Actually, viewpoints on benefits and problems, methodology for assessment of feasibility of different alternatives of well types. Presentation and analysis of equipment and methodology for deviation, high deviation and horizontal boreholes, axial movements, rotation and pumping, also borehole pressure control equipment and methodology. Analysis on methodology of borehole steering, directional changes and control, design and implementation of complex borehole trajectories, presentation of related equipment and components. Borehole trajectory calculations, accuracies. Forcebalances in the borehole, analysis; tension, compression, buckling criteria, fatigue. Application of borehole tractors, concepts and consequences. Drilling of slimhole; use of coiled tubing: Benefits, problems, changes in force- and power application analysis. Discussions.
Teaching methods and activities: Lectures and exercises. Exercises count for 25% of the final grade. The course is held in English if international masterstudents attend. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: Compendium. Relevant textbooks will be announced at semester start.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	75/100	A
EXCERCISES			25/100	

TPG4220 Drilling Fluid

Lecturer: Førsteamanuensis Pål Skalle
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Present how the drilling fluid and hydraulic elements in the drilling programme are decided.
Recommended previous knowledge: Basic subjects in drilling.
Academic content: Different types of drilling fluid and selection of these; driling fluid rheology, density and filter properties, clay mineralogy and the clay's reaction with water, polymers, oil-based drilling fluid, chemical and mechanical hole stability; laminar and turbulent pressure loss in pipes and annuli; hydraulic optimization.
Teaching methods and activities: Lectures and PBL-group work. Port folio evaluation gives the basis for final grade; written exam 50%, exercises 20%, midterm exam 30%. Results are presented by %, final grade by letter grade. The lectures will be held in English if international masterstudents attend. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: SPE textbook: Applied Drilling Engineering. Compendium
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	09.06.2007	09.00	50/100	D
EXCERCISES			20/100	
MIDTERM EXAMINATION			30/100	D

TPG4225 Fractured Reservoirs

Lecturer: Professor Ole Torsæter
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The students will learn basic theory for analyzing flow in fractured reservoirs. The students should learn analytical calculation methods and methods based on numerical simulation through field example applications.
Recommended previous knowledge: Basic knowledge in reservoir engineering.
Academic content: Classification of and concepts for fractured porous media. Model selection. Geological reasons for fracturing. Single phase flow: well tests, storage effects, type curves. Drive mechanisms: capillary forces, gravity, viscous forces, diffusion. Production models: water drive models, gas cap models, modified material balance models and numerical simulation models.
Teaching methods and activities: Lectures and exercises. The lectures will be held in English if international masterstudents attend. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: Articles and lecture notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	100/100	A

TPG4230 Field Development and Operations

Lecturer: Professor Michael Golan
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: To develop capabilities to integrate all petroleum engineering skills including: reservoir, petrophysics, drilling, production and facilities engineering into a process of planning and managing gas and oil fields during their entire life cycle. Upon completion of the course, the participants will understand the procedures involved in planning and managing field production. They will understand the concept of Integrated Field Management and will be acquainted with commercial programs to perform operations technologies, production facilities, seabed and sub-sea facilities, and general approach to offshore field development.
Recommended previous knowledge: TPG4145 Reservoir fluids and flow or equivalent petroleum engineering knowledge. Engineering courses in flow and process technology. Previous courses in reservoir, drilling, production and petrophysics.
Academic content: The course is teaching the methodology and the petroleum engineering skills needed to plan the life cycle of gas and oil fields from the discovery, through the assessment phase, the project and development phases, the field operations period and the abandonment phase. It addresses topics as reserve and recovery estimation, reservoir depletion, production scheduling, number of wells and well placement, planning of production gathering and testing systems, designing well construction, well and production system performance, field processing facilities and export product control.
The course introduces the concept of Integrated Field Mangement, including performance and optimization of field production from the reservoir to the export point.
Teaching methods and activities: Lectures and exercises including one small scope individual project. The exercises and the project account for 40% of the final grade of the course. The course is taught in English. The lectures and exercises will relate to an offshore field in Norway (North Sea or Barents Sea) and will use this field as the focus of the learning. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Given at semester start.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	60/100	C
EXCERCISES			40/100	

TPG4235 Well Testing, Advanced Course

Lecturer: Professor Tom Aage Jelmert
Weekly hours: Autumn: 3F+1Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Obtain practical and theoretical knowledge of well test interpretation. Be able to select and apply the proper mathematical model. Interpretation of special well tests.
Recommended previous knowledge: Basic topics in mathematics. TPG4115 Reservoir characteristics is also recommended.
Academic content: Repetition of the Laplace transformation. Solutions of the diffusivity equation. Elementary discussion of Bessel functions. Flow period diagnostic. Limiting equations. Well test interpretation in homogeneous, fractured and layered

reservoirs. Horizontal wells. The pressure derivative. The effect of anisotropy. Multi-phase flow. Multi-rate testing. Constant pressure testing.
Teaching methods and activities: Lectures and exercises. (PBL). The lectures are held in English. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: Sabet, M.A.: Well Test Analysis, Houston TX, Gulf Publishing Co.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	11.12.2006	15.00	100/100	D

TPG4700 Formation Evaluation - Engineering, Specialization

Lecturer: Professor II Terje Eidesmo, Professor Rune Martin Holt, Professor Tom Aage Jelmert, Professor Jon Kleppe, Amanuensis Helge Langeland, Professor Ole Bernt Lile, Professor Ole Torsæter, Professor Curtis Hays Whitson
Coordinator: Professor Ole Torsæter
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The specialization project should give thorough knowledge within selected parts of Formation Evaluation through independent project work combined with individual supervision and studies of the supporting courses.
Recommended previous knowledge: The students must fulfil the requirements for selecting specialization project in Formation Evaluation. These requirements are either stated in the degree programmes or can execptionally be approved by the lecturer.
Academic content: The subject of interdisciplinary character, with elements from earth science and petroleum engineering. Knowledge of rock parameters, reservoir fluids and flow in porous media from reservoir engineering are combined with knowledge from petrophysics and seismics to obtain improved understanding of the reservoir and its production performance. The most relevant subjects for specialization are:
Petrophysics, selected theory, methods or software (Langeland/Eidesmo)(3,75 SP) Rock Acoustics (Holt) (3,75 SP) PVT/EOR/ GAS (Whitson) (3,75 SP) Reservoir evaluation (Jelmert) (3,75 SP) Fractured reservoirs (Torsæter) (3,75 SP) Reservoir simulation (Kleppe) (3,75 SP) Reservoir physics (Torsæter) (3,75 SP)
Teaching methods and activities: The topic is divided in two, one project work equivalent to 15 SP and a specialized study equivalent to 7,5 SP. The final grade in the specialization subject is determined as a combination between the exam (1/3) and the project work (2/3). Postponed exam for the theory part is held before the exam period expires.
Course materials: Information at start of semester.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TPG4705 Petroleum Production, Specialization

Lecturer: Professor Harald Arne Asheim, Professor Michael Golan, Professor Jon Steinar Gudmundsson, Professor Sigbjørn Sangesland
Coordinator: Professor Harald Arne Asheim
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To develop deeper knowledge of selected areas of production technology. This will be achieved through supervised and guided self-study. The particular topic from the specified list will be selected in collaboration with the teacher.
Recommended previous knowledge: All mandatory courses for specialization in production technology, or acceptance by responsible professor.
Academic content: Subjects related to well construction and productivity. One-phase and multiphase flow wells and equipment. The problem can be attacked analytically, numerically or by physical attempts. Possible sub-topics for the specialization can be: Two-phase flow: Specially aimed against transient effects/Separation: Development or testing of new methods to split oil and gas/Well equipment: Flow relationship in wells, completion/Production with the help from horizontal wells/Underwater completion/Gas technology, gas fields/Optimization of production strategy: Wells, localization, production systems. The following supporting courses to the semester project are offered: Production lab.technique (Asheim) (3,75 SP), Modelling and simulation of production processes (Golan) (3,75 SP), Flow in production wells (Asheim) (3,75 SP), Natural gas technology (Gudmundsson) (3,75 SP), Production technology (Gudmundsson) (3,75 SP), Process technology (Gudmundsson) (3,75 SP), Field PDO (Plan for development and operation) (Golan) (3,75 SP), Well Technology (Sangesland) (3,75 SP).
Teaching methods and activities: The topics are divided into two, one project work corresponding to 15 SP and a specialized study corresponding to 7.5 SP. The final grades will be determined by a combination of an exam (1/3) and the project work (2/3. Postponed exam for the theory part will be held before the end of the exam period.

Course materials: Given at semester start.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TPG4710 Drilling Engineering, Specialization

Lecturer: Professor Rune Martin Holt, Professor Arild Rødland, Professor Sigbjørn Sangesland, Førsteamanuensis Pål Skalle
Coordinator: Førsteamanuensis Pål Skalle
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Objectives: The drilling specialization will focus on developing special knowledge within selected topics based on self-studies combined with support from the lectures. The offered subtopics will be selected in cooperation with the lecturer.
Recommended previous knowledge: The students must have completed all listed subtopics required for the specialization in drilling, or approval must have been given by the lecturer.
Academic content: Drilling technology is a functional, engineering subject. It spans over a wide range of interests like mechanics, hydraulics, corrosion, mechanical construction, measuring techniques, chemistry and petroleum technology.
The following subtopics are offered:
Field course on Svalbard (Egil Tjåland) (3,75 SP), Drilling fluid technology (Pål Skalle)(3,75 SP), Formation Mechanics (Rune M. Holt) (3,75 SP), Underbalanced Drilling (Arild Rødland) (3,75 SP), Geothermal Energy Drilling (Arild Rødland) (3,75 SP), Deep Water Technology (Sigbjørn Sangesland) (3,75 SP).
Teaching methods and activities: The specialization is divided in two parts, a project work corresponding to 15 SP and a specialized study corresponding to 7.5 SP. The final grade will be based on a combination of examination (1/3) and a project work (2/3).
Course materials: Information at start of semester.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TPG4715 Reservoir Engineering, Specialization

Lecturer: Professor Tom Aage Jelmert, Professor Jon Kleppe, Professor Ole Torsæter, Professor Curtis Hays Whitson
Coordinator: Professor Tom Aage Jelmert
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To develop deeper knowledge of selected areas of production technology. Thsi will be achieved through supervised and guided self-study. The particular topic from the specified list will be selected in collaboration with the teacher.
Recommended previous knowledge: All obligatory courses that are listed in the syllabus for reservoir engineering specialization or special approval from the supervisor.
Academic content: Many aspects of reservoir are included, for example:
Properties of reservoir rocks and fluids. One- and multi-phase flow in porous media. The storage and transport capacities of hydrocarbon reservoirs. Production strategies. Well test interpretation. Mathematical and physical models. Reservoir simulation and laboratory experiments.
The most important areas for specialization are: Geological field trip to Svalbard (E.Tjåland)(3,75 SP), PVT/EOR/GAS (C.H.Whitson)(3,75 SP), Reservoir Evaluation (T.Aa.Jelmert) (3,75 SP), Fractured Reservoirs (O.Torsæter)(3,75 SP), Applied reservoir simulation (J.Kleppe)(3,75 SP), Reservoir Physics (O.Torsæter)(3,75 SP).
Teaching methods and activities: The course consists of project work with a work load corresponding to 15 SP and specialized studies corresponding to 7,5 SP. The final grade will be based both on the exam, with weight factor 1/3, and the project 2/3. A make-up exam for the theoretical part will be arranged within the ordinary exam period for those who fail.
Course materials: Given at semester start.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TPG4720 Petroleum Geophysics, Specialization

Lecturer: Professor II Terje Eidesmo, Professor Rune Martin Holt, Professor Martin Landrø, Amanuensis Helge Langeland, Professor Ole Bernt Lile, Professor II Jan Reidar Skilbrei, Førsteamanuensis Egil Tjåland, Professor II Trond H. Torsvik, Professor Ole Torsæter, Professor Bjørn Ursin
Coordinator: Førsteamanuensis Egil Tjåland
Weekly hours: Autumn: 36S = 22.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: This specialized subject aims at deeper knowledge within selected subjects in geosciences through project work combined with subject modules, which are meant to support the project work. The specialized study is further meant to serve as a preparation for the main thesis by making the student acquaified to common scientific work procedures.
Recommended previous knowledge: It is assumed that the student has completed a study which is required to choose a specialization course in Petroleum Geosciences. The study can be in accordance with specifications given in the curricula or under special circumstances from a curriculum approved by the subject teacher.
Academic content: Petroleum geosciences encompasses application and development of all geophysical and geological methods which are important for exploration of petroleum, mapping and description of petroleum reservoirs, together with all types of measurement performed in boreholes. In-depth studies can be done for. Seismic data acquisition and processing/ Inversion and analysis of 4C- and 4D-seismic data/Interpretation of seismic, magnetometric and gravimetric data/Basin modelling/Sedimentologic studies/Saturation and migration studies/Special methods for measurements in boreholes or for using data from boreholes together with other types of data. The most relevant subjects for specialization are: Rock Physics (Holt) (3,75 SP), Geoscience fieldcourse at Svalbard (Tjåland)(3,75 SP), Gravimetry and magnetometry (Skilbrei)(3,75 SP), Fractured reservoirs (Torsæter)(3,75 SP), Petrophysics, selected theory, methods or computer applications (Langeland/ Eidesmo)(3,75 SP), Plate tectonics and basin development (Torsvik)(3,75 SP), Reservoir seismics (Ursin)(3,75 SP), Seismic imaging of sedimentary layers, field course (Landrø/Johansen)(3,75 SP), Seismic Topics (Tjåland)(3,75 SP)
Teaching methods and activities: The subject is divided in two parts, a project work, worth 15 SP and a specialized study (courses) worth 7,5 SP. Final grades will be given as a combination of exam (1/3) and project work (2/3). Delayed exam for the theoretical part will be held within the end of the exam period.
Course materials: Given at start of semester.
Assessment: Oral examination/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	33/100	D
EXCERCISES			67/100	

TPG5100 Applied Mathematics and Computer Methods in Petroleum

Lecturer: Professor Jon Kleppe
Weekly hours: Autumn: 2F+8Ø+2S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Review of important methematical concepts and develop skills in numerical techniques and computer appøications used for solving petroleum related technical problems
Recommended previous knowledge: None.
Academic content: The course covers methods for curve fitting, numerical differentiation, integration, interpolation, solution of equations, solution of systems of equations, statistical methods, numerical solution of differential equations etc. With applications to typical problems in petroleum engineering and geoscience. Emphasis i put on individual programming and use of software packages on the department computers.
Teaching methods and activities: Lectures and Fortran programming exercises.
Course materials: W.H. Preuss and S.A. Teukolsky: Numerical Recipes in Fortran (2nd edition), Cambridge University Press, Cambridge, 1992. Fortran textbook to be announced.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TPG5110 Petroleum Economics

Lecturer: Førsteamanuensis Pål Skalle
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Enhance understanding of the principal economic framework within petroleum sector.
Recommended previous knowledge: BSc in petroleum engineering or equivalent.

Academic content: Oil price model; An introduction to the economic theory of exhaustible resources. Capital budgeting techniques and decision analysis: The main methods of evaluation of investment projects - including the effects of taxes and price variations, cost of capital and the main principles in economic risk analysis.
Teaching methods and activities: Lectures and exercises. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Detailed information will be given at the beginning of the course.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	25.05.2007	09.00	100/100	D

TPG5120 Petrophysics, Basic Course

Lecturer: Amanuensis Helge Langeland
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Acquire knowledge and understanding of the basic concepts and techniques in petrophysics, to a degree sufficient to wither continue study petrophysics at a more advanced level or continue study in those disciplines which might not require more petrophysics competence than acquired from the basic course.
Recommended previous knowledge: BSc in an engineering discipline, including some geoscience study.
Academic content: Introduction to geology and petrology. Physical characterization of rocks, including porosity, permeability and fluid saturation. Fluid flow through porous media. Capillary pressure concepts. Interpretation of petrophysical data. Acquisition of log data including wireline logging coring. Principles of measuring techniques, incl. gamma ray, density, neutron, sonic, formation pressure testing, resistivity, nuclear magnetic resonance borehole measurements. Practical experience with cores. Basic log interpretation methods, Archie equation. Practical log evaluation methods in simple situations and predominantly siliciclastic environments. Influence of shale, rudimentary concepts on interpretation of shaly formations.
Teaching methods and activities: Lectures and exercises. Semester tests count total 30% of final grade. Exercises must have been completed to enter exam. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes, Western Atlas: Introductin to Well Log Analysis, Schlumberger: Log Interpretations Principles/Applications.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	16.12.2006	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TPG5200 Petroleum Engineering and Geoscience, Interdisciplinary Project

Lecturer: Amanuensis Helge Langeland, Førsteamanuensis Pål Skalle
Coordinator: Førsteamanuensis Pål Skalle
Weekly hours: Autumn: 5Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: Students will develop knowledge and expertice across traditional disciplines within exploration and production of oil and gas through a realistic project work. Students will be organized in groups, with students from petroleum geoscience and petroleum engineering.
Recommended previous knowledge: Third semester of the international MSc program in petroleum engineering and petroleum geoscience.
Academic content: The groups will be assigned realistic data from selected oil and gas provinces in the North Sea. The specific content of the project will be defined by the students on basis of a task defined by the industrial partner. To solve the task we have access to oil field data, and to engineering tools used by the industry. At the end of the project, the groups will make a formal presentation of the report for a panel of Professors.
Teaching methods and activities: Exercises (project work) 100%.
Course materials: Description of objectives, required data and references will be handed out.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

Department of Production and Quality Engineering

TPK4120 Safety and Reliability Analysis

Lecturer: Professor Marvin Rausand, Professor Jørn Vatn
Coordinator: Professor Marvin Rausand
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course gives an introduction to basic concepts and approaches related to analysis of safety and reliability of industrial systems and production/distribution of energy.
Recommended previous knowledge: Basic course in probability theory.
Academic content: Definition and discussion of basic concepts related to reliability and risk analysis. Functional analysis and identification and evaluation of faults and hazards. System analysis based on FMECA, reliability block diagrams and fault trees. Quantification of reliability and availability of technological systems. Measures for reliability importance. Analysis of repairable systems by Markov methods. Analysis of safety-critical systems (IEC 61508). Analysis of systems with common cause failures. Estimation of failure rates. Survey of reliability data sources.
Teaching methods and activities: Lectures, project work and exercises. The lectures and the exercises are in English when students who do not speak English take the course. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: M. Rausand and A. Høyland: System Reliability Theory; Models, Statistical Methods, and Applications, Second Edition, Wiley 2004. Supplementary notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	100/100	C

TPK4160 Value Chain Control and Applied Decision Support

Lecturer: Professor Heidi Dreyer, Professor II Jan Ola Strandhagen
Coordinator: Professor Heidi Dreyer
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises and a paper

Learning objectives: The course will give the students a fundamental understanding and knowledge about the supply chain system with the emphasize on processes, ICT, design, and control. The students will be given knowledge on supply chain principals and how value chains can be established, managed and improved.
Recommended previous knowledge: TPK4100 Operation Management.
TPK4135 Production logistics.
Academic content: Operations in supply chain systems from a logistical perspective: Supply chain consepts, product, customer/market needs, deliveries and distribution, production, replenishment, ICT, planning and forecasting. Methods for mapping, analyzing and operation research will be applied for supply chain design and allocation of resources, localisation of manufacturing, inventory and distribution and environment- and cost considerations.
Teaching methods and activities: The lectures will be given in English if needed for foreign students. Lectures and exercises are a combination of literature and examples from textbooks, articles and practical cases in companies. The exercises counts for 40% of the final grade. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Will be given at the beginning of the semester. The literature and prescribed text is English.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	60/100	A
EXCERCISES			40/100	

TPK5100 Project Management 1 - Essentials of Project Management

Lecturer: Førsteamanuensis Bassam A Hussein
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course aims at a thorough introduction to the project work, tools and techniques for evaluating, planning, and monitering projects.
Recommended previous knowledge: None.
Academic content: Management and project management, Projects, programmes and portfolios, Project types and categorization, Qualifications of project members, Project organization, general introduction, Project phases and life-cycle, Project structure, scope, and WBS, Project time schedules, costs and resources. Planning quality, cost and time, milestones and

activities, Monitoring and controlling projects, Earned value analysis, Reporting progress, International standards and associations, Gender mainstreaming, Cultural mainstream. Investment appraisal.
Teaching methods and activities: Lectures, e-learning, assignments, games and project work.
Grading is based on project work (40 %) and final exam (60 %). The lectures and exercises are in English. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Will be given at course startup.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	09.00	60/100	A
EXCERCISES			40/100	

TPK5110 Quality and Risk Management in Projects

Lecturer: Professor Bjørn Andersen, Professor Jørn Vatn
Coordinator: Professor Bjørn Andersen
Weekly hours: Autumn: 2F+3Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give basic insight into the theoretical foundation and practical applications of quality and risk management in projects.
Recommended previous knowledge: Basic knowledge in statistics, probability theory and project management.
Academic content: The project's surroundings, the stakeholder model, stakeholder analysis and management, the business processes of projects, process modeling of projects, performance assessment of projects, using quality improvement tools in projects. Risk managements focuses on risk identification, risk modeling and quantification, updating of risk model in light of the project evolution, and experience and feedback control loops.
Teaching methods and activities: Lectures and group work. The lectures and exercises are in English when students who do not speak Norwegian take the course. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Selected papers and chapters in books and a course compendium in project risk identification and modeling.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	C

TPK5150 RAMS Optimisation

Lecturer: Professor Marvin Rausand, Professor Jørn Vatn
Coordinator: Professor Jørn Vatn
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Not lectured in study year 2006-2007
Grade: Letter grade Compulsory assignments: Semester project

Learning objectives: To give basic insight into the theoretical foundation and practical applications of reliability and maintenance optimsation models. The students shall recognise standard situations related to such optimisation, and be able to develop reasoning for more complicated situations.
Recommended previous knowledge: Basic knowledge in mathematics, probability theory and statistics. General knowledge in optimisation theory.
The courses TPK4120 Safety and Reliability Analysis and TPK4140 Maintenance management or similar background knowledge.
Academic content: Survey of the RAMS (reliability, availability, maintainability and safety) modelling framework and standard optimisation models. System reliability optimisation. Counting processes. Age, block, and minimal repair policies. Optimisation of intervals and intervention level in condition monitoring models. Optimum grouping of maintenance activities. Spare part optimisation. Reliability Centred maintenance. Data collection and analysis.
Teaching methods and activities: Lectures, project work and exercises. In the lectures we will actively use personal computers to solve optimisation problems. Exercises are also based on the use of a personal computer. The lectures and exercises are in English when students who do not speak Norwegian take the course. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Selected papers and book chapters. Specific course compendium.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION			100/100	A

TPK5155 Maintenance Optimisation and Management

Lecturer: Førsteamanuensis Per Schjølberg, Professor Jørn Vatn
Coordinator: Professor Jørn Vatn

Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give basic insight into the theoretical foundation and practical applications of maintenance optimsation models. The students shall recognise standard situations related to such optimisation, and be able to develop reasoning for more complicated situations.
The student shall also obtain basic insight into principles for maintenance management, and go into selected manitenance concepts related to maintenance management.
Recommended previous knowledge: Basic knowledge in mathematics, probability theory and statistics. General knowledge in optimisation theory. The courses TPK4120 Safety and Reliability Analysis and TPK4140 Maintenance Management or similar background knowledge.
Academic content: Age, block, and minimal repair policies. Optimisation of intervals and intervention level in condition monitoring models. Optimum grouping of maintenance activities. Spare part optimisation. Reliability Centred maintenance. Data collection and analysis. Consepts for maintenance management. Computerised Maintenance Systems. Use of maintenance related KPIs (Key performance index). World class maintenance.
Teaching methods and activities: Lectures, project work and exercises. In the lectures we will actively use personal computers to solve optimisation problems. Exercises are also based on the use of a personal computer. The lectures and exercises are in English when students who do not speak Norwegian take the course. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Selected papers and book chapters. Specific course compendium.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2006	09.00	100/100	A

TPK5160 Risk Analysis

Lecturer: Professor II Stein Haugen
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Semester project

Learning objectives: The course gives an introduction to basic concepts and methods for risk analysis, and how risk analyses are applied in different industries and applications.
Recommended previous knowledge: Basic course in probability theory.
Academic content: Definition and discussion of basic concepts of risk analysis. Risk metrics. Risk acceptance criteria. Qualitative and quantitative methods for risk analysis, like preliminary hazard analysis, HAZOP, fault tree analysis, and event tree analysis. Analysis of human errors and organizational factors. Barrier analysis. Identification and analysis of common cause failures. Data sources and uncertainties. Rules, standards, and guidelines. Risk reduction and cost/benefit analysis. Survey of how risk analyses are performed within different industries and applications.
Teaching methods and activities: Lectures, project work and exercises. A mandatory project shall be carried out as group work, and will count 30% in the evaluation. The lectures and exercises are in English when students who do not speak Norwegian take the course. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Specific course compendium.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	09.00	70/100	C
EXCERCISES			30/100	

TPK5165 RAMS Engineering and Management

Lecturer: Professor Marvin Rausand, Professor Jørn Vatn
Coordinator: Professor Marvin Rausand
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course provides insight on how to incorporate reliability, maintainability, and safety aspects into all phases of the life cycle of a product or a system.
Recommended previous knowledge: The course TPK4120 Safety and Reliability Analysis or similar background knowledge.
Academic content: Reliability, availability, maintainability, and safety (RAMS) requirements during the whole life cycle of a product or a system. RAMS management in product development. RAMS requirements and specification. Analytic qualification and acceptance testing. Collection and utilization of experience data. Assessment of production regularity and life cycle cost/profits.

Teaching methods and activities: Lectures, project work and exercises. A mandatory project shall be carried out as group work, and will count 30% in the evaluation. The lectures and exercises are in English when students who do not speak Norwegian take the course. If there is a resit examination, the examination form may be changed from written to oral.
Course materials: Selected papers and book chapters. Specific course compendium.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.05.2007	09.00	70/100	C
EXCERCISES			30/100	

Department of Engineering Cybernetics

TTK4160 Medical Imaging

Lecturer: Professor Bjørn Atle J. Angelsen
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course shall gives fundamental knowledge about physical phenomena, mathematical modelling, and algorithms used in medical imaging.
Recommended previous knowledge: Requires Math 1- 4, Physics, TTK4105 Control theory, TTK4115 Linear systems theory, or similar background
Academic content: Wave equation for acoustic fields. Solution in one and three dimensions. Approximations for long wavelengths (Poisson's equation) and short wave lengths (ray theory). Ultrasound transducers and beam forming. Scattering of ultrasound from soft tissue. Modelling of ultrasound imaging. The Doppler effect from moving scatterers. Measurement and imaging of blood velocities and contraction in the heart muscle. Wave equation for electromagnetic (EM) fields. Fields from active biological EM sources like neuro and muscle cells. Determination of sources from field measurements (Inverse problem). Optical measurements and imaging. X-Ray computer tomography. Magnetic resonance imaging of soft tissue.
Teaching methods and activities: Lectures, calculation exercises, demonstrations.
Course materials: Announced at the start of the course.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2006	15.00	100/100	D

TTK4165 Signal Processing in Medical Imaging

Lecturer: Professor Hans Torp
Weekly hours: Spring: 2F+6Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject shall provide knowledge about signal processing methods and their applications within medical imaging diagnostics.
Recommended previous knowledge: The subjects TTT4120 Digital Signal Processing and TTK4160 Medical Imaging. Basic knowledge in mathematics, progamming and signal processing.
Academic content: Mathematical model for pulse-echo imaging systems based on signals in space and time. Effects from limited bandwidth and sampling on resolution in space and time. Representation of dynamic images by means of multi dimensional Fourier analysis. Practical reconstruction algorithms for 2D and 3D imaging. Use of grayscale/color graphics to achieve dynamic image information. Estimation of power spectrum and auto correlation applied on ultrasound Doppler signals. Application mainly within ultrasound-imaging, but also other medical imaging techniques will be treated.
Teaching methods and activities: Lectures, laboratory demonstrations, computer exercises, paper exercises.
Course materials: Textbook and/or lecture notes will be announced at start of the semester.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.05.2007	09.00	100/100	D

TTK4170 Modelling and Identification of Biological Systems

Lecturer: Professor Bjørn Atle J. Angelsen
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject shall give knowledge about modelling and parameter estimation applied to medical problems.

Recommended previous knowledge: Requires Math 1 - 4, Physics, TTK4105 Control theory og TTK4115 Linear system theory, or similar knowledge.
Academic content: The course treats mathematical modelling of biological systems, together with methods of using such models to extract information from medical measurements and images. Modelling and identification of the cardiovascular system is especially addressed, and also identification of systems without apriori models.
Teaching methods and activities: Lectures, computational exercises
Course materials: Given at the start of the course
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	100/100	D

TTK4190 Guidance and Control

Lecturer: NN
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: Emphasis is placed on modelling of vessel motion and design of control systems for ships and underwater vehicles using state-of-the-art navigation systems.
Recommended previous knowledge: Courses TTK4105 Control Systems and TTK4150 Nonlinear Systems or equivalent. It is recommended to study this subject together with TMR4240 Marine Control Systems.
Academic content: Methods for design and implementation of industrial GNC systems for ships, semi-submersibles, underwater vehicles, and high-speed craft. This includes mathematical modeling of marine vessels and the environment (waves, currents and wind) in 6 DOF. Emphasis is placed on kinematics (Euler angles and unit quaternions), rigid-body dynamics, hydrodynamics and vectorial mechanics. Applied control theory and synthesis in terms of linear quadratic optimal control and state estimation (Kalman filtering), nonlinear observer theory, PID control with extensions to nonlinear systems, Lyapunov methods, sliding mode control, feedback linearization, backstepping designs, passivity, observer-based feedback, and observers design for marine vessels.
Teaching methods and activities: Lectures and problem sets. The assignments are given as computations and simulations in Matlab/Simulink. Hydrodynamic software (ShipX and WAMIT) is used to compute vessel data and to construct a vessel simulator for testing of feedback control systems. Portfolio evaluation is the basis for the final grade in the subject. Parts of the portfolio are final exam in writing 70%, and midterm test 30%. The result for each part is given in percentage units, while evaluation of the entire portfolio (the final grade) is given as a letter. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Thor I. Fossen: Marine Control Systems: Guidance, Navigation and Control of Ships, Rigs and Underwater Vehicles (Marine Cybernetics AS, 2002), ISBN 82-92356-00-2.
Conference and Journal Papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	70/100	A
MIDTERM EXAMINATION			30/100	A

Department of Electronics and Telecommunications

TTT4125 Information Theory, Coding and Compression

Lecturer: Førsteamanuensis Lars Magne Lundheim
Weekly hours: Autumn: 4F+1Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The purpose of the course is twofold. Fisrtly, it aims at gving the student an understanding of formal mathematical models of information and communication that enables a quantifiacation of the theoretically optimal performance of a communication system. Secondly, the student should get insigth in how these theoretical limits can be reached through practical algorithms and methods.
Recommended previous knowledge: TTT4115 Communications or equivalent.
Academic content: Modelling and analysis of components in a generic communication system. Mathematical definitions of information content and channel capacity. Principles for optimal information transfer across various types of channels. Lossless data compression. Rate Distortion theory. Principles and methods for practical digital representations. Practical channel coding. Performance assessment relative to information theoretic limits.
Teaching methods and activities: Lectures and voluntary exercises
Course materials: Geir E. Øien and Lars Lundheim: Informasjonsteori, koding og kompresjon. Kompendium, Tapir, Kompendieforlaget, 2003.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	05.12.2006	09.00	100/100	D

TTT4135 Multimedia Signal Processing

Lecturer: Professor Andrew Perkis
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The subject should provide understanding of advanced techniques, algorithms and concepts for digital processing of audiovisual information. The processing will be highlighted by applications from multimedia systems.
Recommended previous knowledge: TTT4120 Digital Signal Processing or equivalent.
Academic content: The course treats audiovisual signals (speech, audio, images and video) and their characteristics relevant to applications in multimedia systems as well as principles and methods for digital processing of audiovisual information. The topics covered are: Statistical characterisation, parametric modelling and digital representation of speech, audio, images, video and graphics. Principles and algorithms for compression of speech, audio, images and video. Combined processing of different media types such as manipulation and integration of audiovisual information. Synthetic images and graphics. Annotation of audiovisual information and methods for search and retrieval of audiovisual information. Multimedia processors and implementation issues of multimedia systems. Multimedia applications, interactivity, multimedia presentations
Teaching methods and activities: Lectures, voluntary exercises, mandatory computer exercises
Course materials: Jerry Gibson, Toby berger, Tom Lookabaugh, Dave Linbergh and Richard Baker: Digital Compression for Multimedia: Principles and standards, Morgan Kaufmann publishers, 1998.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	09.06.2007	09.00	100/100	D

TTT4140 Fundamentals of Navigation

Lecturer: Professor Børje Forssell
Weekly hours: Autumn: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To give students knowledge of the fundamental geodetic, mathematical and statistical requirements for design and utilisation of navigation systems and navigational data.
Recommended previous knowledge: Knowledge of Mathematics and Mathematical Statistics corresponding to a Bachelor's degree in Engineering Sciences at NTNU.
Academic content: The geophysical and geodetical fundamentals of navigation, positioning and localisation, i.e. shape and physics of the earth, reference and coordinate systems, maps and mapping projections, calculations on the surface of the earth, satellite navigation, error calculations and optimised utilisation of navigational data, particularly Kalman filtering.
Teaching methods and activities: Lectures and exercises. 10 exercises with solutions are available on the web site. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: B. Forssell: Radionavigation Systems, Prentice Hall 1991(reproduced by Tapir). R. Grover Brown, P.Y.C. Hwang: Introduction to random signals and applied Kalman filtering, 3rd ed., John Wiley og Sons, Inc. 1997. Lecture notes.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	11.12.2006	15.00	100/100	D

TTT4150 Navigation Systems

Lecturer: Professor Børje Forssell
Weekly hours: Spring: 4F+2Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To familiarise the students with principles and requirements in electronics, signal processing, wave propagation and system technology fundamental to the design and use of navigation systems, as well as with the functions and performance of existing and planned navigation systems.
Recommended previous knowledge: Knowledge of electrical engineering fundamentals, mathematics, statistics and fundamentals of electronics, corresponding to a B.Sc. in electrical and electronics engineering. Signal processing, antennae, microwave techniques, wave propagation.
Academic content: Wave propagation along the surface of the earth and in the atmosphere, hyperbolic navigation, terrestrial and satellite-based navigation systems as LORAN-C, radio beacons, GPS, GLONASS, GALILEO, aircraft navigation systems, inertial navigation, and radar principles and methods.

Teaching methods and activities: Lectures, exercises and equipment demonstrations. The exercises consist of 10 problems with solutions, all accessible via the web site of the Department. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: B. Forssell: Radionavigation Systems, Prentice Hall, 1991, (reproduced by Tapir). Texts about radar published by the Department of Telecommunications, journal articles.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2007	09.00	100/100	D

TTT4155 Remote Sensing

Lecturer: Professor II Jens F. Hjelmstad
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course gives the student an introduction to the use of electromagnetic waves for remote sensing and an overview of existing and future systems, with a focus on satellite systems.
Recommended previous knowledge: General knowledge of physics and electronics essential, specialised knowledge in microwave systems, electrooptics, laser systems, satellite design, digital signal processing and detection theory an advantage, but no prerequisite. NTNU subjects TFE4130 Wave propagation, TTT4120 Digital signal processing and TFE4160 Electro Optics are relevant, but not compulsory.
Academic content: Basic properties of electromagnetic waves. Scattering and interection of electromagnetic waves with gases and solid materials in optical, IR and microwave bands. Principles of remote sensing instruments, such as imager, radiometer, scatterometer, lidar, radar, synthetic aperture radar, altimeters. Present and future satellite surveillance systems.
Course materials: Books, compendium
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2006	09.00	100/100	D

Department of Hydraulic and Environmental Engineering

TVM4160 Material Flow Analysis

Lecturer: Professor Helge Brattebø, Professor II Aage Heie
Coordinator: Professor Helge Brattebø
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments

Learning objectives: The course aims to give introductory understanding og MFA theory and methodology, and skills so that they can carry out simplified, but correct and good analyses, also using MFA software. Furthermore, students shall know about important applications of MFA, and understand the usefulness of MFA for development of good resource and environmental handling of material and waste flows in society.
Recommended previous knowledge: TVM4162 Industrial Ecology, or TVM4150 Solid Waste Management, or similar background, as well as basic mathematics (matrix algebra and differential equations)
Academic content: The course includes theory, methodology and examples from applying material flow analysis (MFA), which is a systematic assessment of flows and stocks of materials within a given system defined in space and time. A good documentation of material flows is a prerequisite for an optimum management of resources and environmental issues, including avoiding the risk of suboptimisation. The theoretical and methodological elements of the course include: i) material flow analysis in a historical perspective with respect to methodology and applications, ii) methodology, technical elements and software in material flow analysis (MFA) and substance flow analysis (SFA), and iii) dynamic analysis. Examples will include material flow analysis at the national, sectoral and local levels, and are related to typical problems in environmental and resource management, material flows in society's built environment, as well as in solid waste management and recycling systems.
Teaching methods and activities: Lectures and exercises. The course will be taught in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Various course materials will be used and distributed electronically (It'sL:learning) during the semester.
Assessment: Written/Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2007	09.00	50/100	D
EXCERCISES			50/100	

TVM4162 Industrial Ecology

Lecturer: Professor Helge Brattebø
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises in groups

Learning objectives: The course shall give students an overview knowledge of theory, analytical methodology and practical challenges in the field of industrial ecology. Emphasis is given to the understanding of how environmental assessment and improvements are carried out with support from systems analytical methods such as material flow analysis, risk analysis, life cycle analysis, energy analysis, costbenefit analysis and eco-efficiency analysis.
Recommended previous knowledge: Introductory courses in Environmental Science or Environmental Engineering or Technology.
Academic content: Industrial ecology is the study of materials and energy flows i product systems and society, the environmental impacts of these flows, and the influence of technology and socio-economic factors. This course introduces perspectives, theory and methods for quantitative analysis, as well as implementation of industrial ecology, in four parts. Part A defines industrial ecology and presents the material and energy turnover in society. Part B presents the theoretical foundation for industrial ecology, including systems theory, thermodynamics and biology/ecology, and design principles in industrial ecology. Part C gives a thorough introduction to quantitative analytical methods, such as material flows analysis, risk assessment, energy and exergy analysis, life cycle analysis, input-output analysis, cost-benefit analysis, and eco-efficiency analysis. Part D covers problems and methods when implementing industrial ecology in policy, and in private and public sectors.
A group work project is included, where students are given the opportunity to study the products, production technology, material and energy flows, and the environmental aspects of a chosen industrial sector.
Teaching methods and activities: Lectures, seminars and project work in interdisciplinary groups. The course is taught in English. Portfolio assessment is the basis for the grade in the course. The portfolio includes a final written exam (50%) and exercises (50%). The results for the parts are given in %-scores, while the entire portfolio is assigned a letter grade. Postponed/ repeated exams may be oral.
Course materials: Own developed course materials/textbook.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	20.12.2006	15.00	50/100	D
EXCERCISES			50/100	

TVM5105 Hydrology for Hydropower, Basic Course

Lecturer: Professor Ånund Killingtveit
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the first year in the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. This course TVM5105 together with TVM5125 is replacing the course TVM5110 Hydropower Planning 2 in the HPD study programme. The course covers the basics in hydrology for civil engineers.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineeering or similar. The course is prerequisite for the TVM5130 Hydropower Project.
Academic content: Basic hydrology, applied hydrology and computational hydrology in the context of hydropower development.
Teaching methods and activities: The lecturerers come from the university and the hydropower industry, all with international experience. Lectures and exercises are to a large extent integrated. All lectures and exercises are given in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Books for the series "Hydropower Development" and supplementary lecture notes (English).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	100/100	D

TVM5115 Planning and Design of Dams, Basic Course

Lecturer: Førsteamanuensis II Leif Lia
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the first year of the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. The course covers the basic

in dam engineering for civil engineers, including planning and design of concrete and embankment dams, soil mechanics for dams and concrete technology for dams. The students shall know the basic design and construction principles for various types of dams and be able to select type of dam and design and estimate the costs for a damsite after completion of the course.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineering or similar. The course is a prerequisite for TVM5130 Hydropower Project.
Academic content: Planning and design of dams in the context of hydropower development. The course covers the basics in dam engineering for civil engineers, including concrete and embankment dams, soil mechanics for dams and concrete technology for dams.
Teaching methods and activities: The lecturers come from the university and the hydropower industry, all with international experience. All lectures and exercises are given in English. The topic embankment dams will be addressed through a one week seminar during one of the two activity weeks during the semester. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Books from the series "Hydropower Development" and supplementary lecture notes (English).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	01.12.2006	09.00	100/100	D

TVM5125 Hydraulic Design, Basic Course

Lecturer: Amanuensis Yngve Robertsen, Professor Haakon Støle
Coordinator: Professor Haakon Støle
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the first year in the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. The students shall be able to plan and design hydraulic structures and waterways of a hydropower plant based on the content of the course.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineering or similar. The course is a prerequisite for the TVM5130 Hydropower Project.
Academic content: The course covers the basics in fluid mechanics, hydraulic design of dams and spillways, scour protection, fluvial sediment transport, turbines and surge tanks, hydraulic steel works and power house design.
Teaching methods and activities: The lecturers come from the university and the hydropower industry, all with international experience. Lectures and exercises are to a large extent integrated. All lectures and exercises are given in English. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Books from the series "Hydropower Development" and supplementary lecture notes (English).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	04.12.2006	09.00	100/100	D

TVM5130 Hydropower Plants, Project Work

Lecturer: Førsteamanuensis II Leif Lia, Professor Haakon Støle
Coordinator: Professor Haakon Støle
Weekly hours: Spring: 12Ø+12S = 15.0 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The students shall through the project work apply integrated hydropower planning methods. The students shall address technical, economic and environmental issues of a hydropower development of a river basin on a pre-feasibility level.
Recommended previous knowledge: The project work assumes completion of the basic courses: Dam Engineering, Geology and tunnelling, Hydrology for hydropower, Hydraulic design, Planning hydropower, Environment and economics.
Academic content: The project work covers a pre-feasibility (desk) study for an actual river system which is carried out in groups of 3-5 students.
Teaching methods and activities: Lectures covering project identification, the screening process etc. and supervision throughout the project period as required by the students will be given.
Course materials: Various relevant data such as topographic maps, hydrology data, geology maps, NVE's data base on costs, etc.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

TVM5135 The Planning Process of Hydropower Projects, Basic Course

Lecturer: Professor II Odd Guttormsen, Professor Haakon Støle
Coordinator: Professor Haakon Støle
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the first year in the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. The course covers the main phases of a hydropower development project.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineering or similar. The course is a prerequisite for TVM5130 Hyropower Project.
Academic content: Organization and management of hydropower studies, implementation of hydropower and water resources projects, tender and contracts, construction management and small scale hydropower development.
Teaching methods and activities: The lecturers come from the university and the hydropower industry, all with international experience. Lectures and exercises are to a large extent integrated. All lectures and exercises are given in English. An excursion to various Norwegian hydropower plants are arranged during the first week of September. Some topics will be lectured as seminars over 3 to 5 days. This will be organized to avoid conflicts with the other courses in the HPD programme, i.e. TVM5115, TVM5105 and TVM5125 wich are running in parallel with this course. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Books from the series "Hyropower Development" and supplementary lecture notes (English).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	100/100	D

TVM5140 Environmental and Economic Assessment of Hydropower Projects, Basic Course

Lecturer: Professor Haakon Støle
Weekly hours: Spring: 4F+4Ø+4S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments

Learning objectives: The course is offered in English to the students in first year in the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. The course covers environmental assessment and environmental mitigation measures for hydropower plants, basic economic analysis and the basis for technical-economical optimisation of hydropower plants for planners and project managers of hydropower projects.
Recommended previous knowledge: Admission to the HPD MSc programme, admission to Civil and Environmental Engineering or similar. The course is a prerequisite for TVM5130 Hydropower Project.
Academic content: Economic design criteria, investment and socio-economic analysis, environmental impact assessment studies and measures for mitigation of unfavourable environmental impacts.
Teaching methods and activities: Lecturers come from the university and the hydropower industry, all with international experience. All lectures and exercises are given in English. The lectures will be concentrated during the first half of the spring semester to prepare for TVM5130. Some topics will be lectured as seminars over 3 to 5 days. This will be organized to avoid conflicts with other course in the HPD programme, i.e. TVM5145 which is running in parallel with this course.
Course materials: Books from the series "Hydropower Development" and supplementary lecture notes (English).
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	18.05.2007	09.00	100/100	D

TVM5150 River System Analysis, Advanced Course

Lecturer: Professor Ånund Killingtveit
Weekly hours: Autumn: 3F+2Ø = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the second year in the MSc programme Hydropower Development and to siv.ing.students in the study programme Civil and Environmental Engineering. The course objective is extended knowledge of computer and numerical model applications in river system studies.
Recommended previous knowledge: The course is based on TVM5105 Hydrology for Hydropower in the first year of the HPD-programme or TVM4105 Hydrology in Civil and Environmental Engineering.
Academic content: Discussion and application of the main computer models for river system analysis. Applied separately or integrated (River System Simulator).
Teaching methods and activities: Lectures, workshops, computer model applications, both as exercises and applied on actual rivers.

Course materials: Å. Killingtveit and N.R. Sælthun: Hydrologi. Articles, reports and computer model descriptions.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	11.12.2006	09.00	100/100	D

TVM5160 Headworks and Sedimentation Engineering, Advanced Course

Lecturer: Professor Haakon Støle
Weekly hours: Autumn: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is offered in English to the students in the second year in the MSc programme Hydropower Development and to siv.ing. students in the study programme Civil and Environmental Engineering. The objective is to give a comprehensive basis for engineers who will be responsible for planning and design of the headworks of water resources projects in rivers loaded with sediments.
Recommended previous knowledge: The basic course TVM5125 Hydraulic Design and TVM5115 Dam Engineering in the first year of the HPD programme or TVM4116 Fluid Mechanics and preferably TVM4165 Hydro Power and Hydraulic Structures in the study programme Civil and Environmental Engineering.
Academic content: Sediment transport theory, the theory of physical hydraulic modelling and the use of water resources in sediment loaded rivers. Extended discussion on reservoir sedimentation, planning and design of headworks for run-of-river hydropower plants, sediment handling techniques, sediment sampling and analysis of sediment data.
Teaching methods and activities: Lectures, assignments and extensive laboratory exercises.
Course materials: Lysne, Glover, Støle and Tesaker: Hydraulic Design. Vanoni: Sedimentation Engineering. Støle: Withdrawal of Water from Himalayan Rivers and hand-out literature with supplementary articles, cases and lecture-notes (English).
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	16.12.2006	09.00	100/100	D

TVM5170 The Process of Social Impact Assessment, Advanced Course

Lecturer: Professor Haakon Støle
Weekly hours: Autumn: 5Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignments

Learning objectives: The course is offered in English to the students in the second year in the MSc programme Hydropower Development. The objectives are to improve the knowledge of the different stages of the process of socio-economic assessment, including strategic priorities and national guidelines, and to improve tools for planning projects in the best possible way on a national, regional and local level.
Recommended previous knowledge: The course ia based on TVM5140 Environmental and Economic Assessment of Hydropower in the first year of the MSc programme.
Academic content: The Internet based course consists of 13 modules, and one new module is presented every week. The course comprises: Background and development of SIA, impact assessment methodologies, baseline data and mitigation measures, stakeholder consultation process, health issues, education, training and gender issues, the role of NGOs and monitoring, resettlement, livelihood development, environmental and technical issues, institutional strengthening and capacity building, finance and budget issues, indigenous peoples and vulnerable groups.
Teaching methods and activities: The main core of the course is a distance-learning course on the Internet. The introduction to the course will be in a classroom setting and advisors will be available on a weekly basis in order to facilitate discussions and assistance to the students related to the weekly quiz or set of multiple-choice questions in each module and writes short reports. Evaluation will be based on each students workbook, containing all weekly reports etc. and an oral exam.
Course materials: All the course material is available for the participants on the Internet in English.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	13.12.2006	09.00	100/100	D

TVM5175 Industrial Ecology, Project

Lecturer: Professor Helge Brattebø
Weekly hours: Autumn: 12Ø+12S = 15.0 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The student shall through project work be trained in independent scientific work in industrial ecology, with focus on good formulation of working problems, application of methods, literature search and synthesis, as well as analysis

and evaluation of results, where theory and practical problems are seen in combination, and to present such work in the form of a scientific article. The course shall also prepare for a good design of the forthcoming master thesis.
Recommended previous knowledge: It is recommended to have one year of study background from the MSc in Industrial Ecology programme at NTNU.
Academic content: The content of this course shall relate to a defined problem in the field of industrial ecology, in collaboration with the teacher. The course make use of theory and methodology from industrial ecology for the evaluation of environmental performance in technical systems, preferably in the waste management sector with respect to utilization of waste resources by recycling. The problem may be addressed by use of systems analysis methods, such as material flow analysis, life cycle analysis, or cost benefit analysis, and may well be connected to an external company.
Teaching methods and activities: Project work with tutoring, in combination with self studying. The project may be carried out individually or as group work, depending on the number of students. The language can be in English or Norwegian, according to preferences.
Course materials: To be defined together with the teacher, and in line with the nature of the project.
Assessment: Excercises

Forms of assessment	Date	Time	Percentage	Exam. support
EXCERCISES			100/100	

PhD courses

DT8112 Research Topics in Health Informatics

Lecturer: Førsteamanuensis Øystein Nytrø
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Pass/Fail Compulsory assignments: None

Recommended previous knowledge: Healthcare informatics, or informatics with practical healthcare experience.
Academic content: The subject is held biannually, next time spring 2008, or as needed.
The course focusses on the challenge of the duality between basic computer science and applied (healthcare) informatics research. Core problem areas selected by the students are analysed from different prespectives, and each student makes complementary article-sketches, both within application and basic theory. The core problems may be chosen from recent computer science research applied to clinical healthcare information systems, eg: Knowledge representation, development methods, inforamtion security, architecture, user interfaces, information analysis, data mining, machine learning, decision- and cooperation support.
Teaching methods and activities: Seminar
Course materials: Research reports. Conference- and journal papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
Portfolio assessment			1/1	

MT8300 Electrolysis of Light Metals 2

Lecturer: Førsteamanuensis Øyvind Tveter Gustavsen
Weekly hours: Spring: 3F+2Ø+7S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Recommended previous knowledge: It will be a advantageous to have knowledge corresponding to the subject MT8104 Electrolysis of Light Metals 1. The present subject is a continuation of this subject, with emphasis on the industrial application of the process.
Academic content: The course is given every year. The subject concerns the practical application of the theory of light metal production, with emphasises the aluminium electrolysis. The main topics are: Energy balance and thermochemistry, bath chemistry, additives and physico-chemical properties of bath, alumina, its properties, solubility in the bath, and alumina feeding, current efficiency and energy consumption, magnetic fields,operation of industrial cells, process control, practical improvements of the process in the past, present and in the future.
Teaching methods and activities: Voluntary exercises.
Course materials: Literature: K. Grjotheim and H. Kvande (Editors):
"Introduction to Aluminium Electrolysis - Understanding the Hall-Heroult Process", 2nd Edition, Aluminium Verlag, Düsseldorf, 1993.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION			1/1	D

MT8301 Carbon Materials Technology
Lecturer: Professor II Morten Sørlie
Weekly hours: Spring: = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Colloquim

Learning objectives: The course will provide an introduction to carbon science, technology and materials. The most important fundamental principles will be covered in more depth. From an engineering point of view it will be shown how the choice of raw materials and processing parameters can tailor carbon materials to given specifications within a wide property and application range.
Recommended previous knowledge: BSc or similar.
Academic content: The course is given every second year, next time will be spring 2007. Carbon materials used industrially will be treated with emphasis on fundamental principles and properties that have given carbon its broad industrial application. Lectures will also cover areas of carbon science and technology that more recently have resulted in great scientific activity. Lectures will cover raw materials, the carbonization process, graphitization, carbons refractory properties, oxidation processes, carbon electrodes in metallurgical and electrometallurgical industry, carbon fibers and carbon-carbon composites, active carbon, intercalation compounds, synthetic diamonds, fullerenes, and others.
Teaching methods and activities: Towards the end of the semester each student has to present a 30 min colloquium within a narrow part of the curriculum. The presentation will be evaluated and marked.
Course materials: Literature: Selected parts from published books and articles from publications.
Assessment: Written/Midterm examination

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2007	09.00	70/100	
MIDTERM EXAMINATION			30/100	

Faculty of Architecture and Fine Art

AAR4230 Planning and Construction in Developing Countries, Advanced Course
Lecturer: Professor Hans Christie Bjønness
Weekly hours: Spring: 3F+1Ø+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The course is to give an introduction to basic preconditions and applicable knowledge for carrying out planning, infrastructure and construction activity on a sustainable basis in developing countries.
Recommended previous knowledge: None.
Academic content: Planning for sustainable development requires knowledge on a broad interdisciplinary basis. The course will discuss the basis for the theories and methods related to social and urban sustainable development, planning and construction activity. Environmental, socio-economic, physical and cultural factors need to be seen in context, as well as considering the different local conditions. There will be emphasis on cases that illustrate different conditions and institutional frameworks for the development and execution of cooperative development projects. Crisis planning for re-construction measures after disasters will also be included. An exercise is to be carried out with project documents according to UN template, and goal-based project planning as applied by NORAD (LFA).
Teaching methods and activities: The course is given in cooperation with several departments at the Faculty of Architecture and Fine Art, the Faculty of Engineering Science and Technology, and the Faculty of Social Science and Technology Management. Weight is placed on interdisciplinary seminars with introductory speakers from other faculties and specialists with experience in development-related issues. Case studies are presented and discussed. One exercise is to be carried out as group work.
Course materials: Compendium.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	21.05.2007	09.00	100/100	C

Department of Geography

GEOG3506 Geography, Health and Development
Lecturer: Førsteamanuensis Stig Halvard Jørgensen
Weekly hours: Autumn: 2F+1Ø+9S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Approved term paper and presentation

Learning objectives: The course aims to give a broad overview of geographical perspectives on health with two main focuses:
1) Health status, disease/injury and risk/risk factors.
2) Geography of health services at different levels, with emphasis on demand and use, availability and accessibility, prevention, and treatment.
Recommended previous knowledge: See formal requirements.
Academic content: The main emphasis of the course is on the situation in developing countries, but more general development trends in health and health services in different parts of the world are also covered. As well as a common core curriculum, two in-depth courses (curriculum variations) are offered: one that studies developing countries? perspectives in more detail, and a guideline for studying westernized countries (among which Norway is central). The course covers studies in quantitative and qualitative method traditions.
Part of the study is based on student?s own reading which forms the foundation for carrying out the semester essay. This is presented at a seminar. A seminar is also arranged on searching for medical and health literature in libraries and databases (3 hours). The semester essay and presentation must be approved before the written examination can be taken.
Teaching methods and activities: Teaching method and activities: 20 hours lectures, 8 hours seminars.
Compulsory activity: Approved term paper and presentation.
Form of assessment: 4 hour written exam.
Course materials: Given at the start of the semester.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2006	09.00	1/1	C

GEOG3561 Gender and Social Change

Lecturer: Førsteamanuensis Cathrine Brun
Weekly hours: Autumn: 2F+1Ø+9S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues..
Academic content: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues. The course seeks to combine an interdisciplinary and subject-specific approach. It aims at outlining different perceptions of gender within different social scientific traditions. Theoretical and methodological problems related to the use of gender as an analytical category and how these are manifested in social scientific research are examined. The course also includes presentations of empirical material from gender-specific research within the field of geography and other social sciences.
Teaching methods and activities: Teaching method: 18 hours lectures and seminars with active involvement from students.
Form of assessment: Written exam (4 hours)
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	08.12.2006	09.00	1/1	

Faculty of Medicine

MFEL1010 Medicine for Non-Medical Students, Introduction

Lecturer: Førsteamanuensis Asbjørn Støylen
Weekly hours: Autumn: 3F+3Ø+6SSpring: = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Pass/Fail Compulsory assignments: PBL exercises

Learning objectives: Course objective:
The aim of the course is to provide a general introduction to medicine to students who wish to apply their knowledge in projects within medicine. The course is particularly directed towards students within the fields of technology, informatics and administration, but will also serve as a perspective theme.
Recommended previous knowledge: No previous knowledge of medicine is necessary.
Academic content: Course description:
The course will focus on the body’s composition and function (anatomy/physiology) from cell to organ level, and the causes of the most common disorders like heart attack, cancer, chronic obstructive pulmonary disease and brain stroke. The course will further pay attention to how the health care system works and how patients are examined and treated when they consult the doctor with symptoms. The use of technology in medicine will be emphasized. Ethical considerations which may arise when using medical technology and informatics will also be discussed.
Teaching methods and activities: Lectures. They are given "live" only on the autmn term, but all lectures are available on the net as video (*.avi for windows), and the presentations are available as *.pdf.
PBL questions. Those are mandatory, and are solved on the net.

Course materials: Course literature:
Menneskekroppen. Fysiologi og anatomi, Universitetsforlaget (ISBN 82-00-41831-6)
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	16.12.2006	09.00	100/100	D

MOL4010 Molecular Biology for Technologists

Lecturer: Professor Berit Johansen, Professor Astrid Lægreid
Coordinator: Post doktor Torunn Bruland
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Participation at PBL exercises

Learning objectives: Course objectives:
The aim of the course is to provide technology students with a general introduction to biochemistry, molecular biology and genetics, so that they acquire an insight into how technology can be use within these fields.
Recommended previous knowledge: Recommended background knowledge:
2. year of civil engineering or equivalent education.
Academic content: Course description:
The course aims at providing the students with an introduction to the molecular mechanisms which are the foundations of biological processes in cells and organisms. An introduction to necessary biological background knowlegde will be given. Fundamental principles within molecular biology and genetics will also be covered. Ethical considerations connected with the use of gene technology will be discussed.
Teaching methods and activities: Teaching modalities:
Problem-based learning in groups, lectures and visit to a molecular biologic laboratory.
Course materials: Course literature:
Raven et al: Biology, McGraw-Hill
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	18.05.2007	09.00	100/100	D

MTEK3001 Applied Bioinformatics and Systems Biology

Lecturer: Professor Finn Drabløs
Weekly hours: Spring: 3F+3Ø+6S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: The aim of the course is to give the students a basic introduction to applied bioinformatic methods, including principles from systems biology, making the students capable of applying relevant methods to their own problems.
Recommended previous knowledge: Basic knowledge in molecular biology corresponding to Molecular Biology for Technologists, statistics corresponding to Statistics with Applications and informatics corresponding to Information Technology, Introduction.
Academic content: The course aims at providing an introduction to the use of important methods in bioinformatics, including sequence library searches, pairwise and multiple alignment, phylogenetic analysis, gene prediction and structure prediction. The usage of these methods is also discussed in a systems biology context, and ontologies, large scale analysis and studies of complex systems will be discussed. The students will be able to test the methods on realistic problems through PC-based exercises. There will be emphasis on using an interdisciplinary approach during presentations and exercises, in order to make the course accessible to students in informatics as well as medicine and molecular biology.
Teaching methods and activities: Lectures and exercises (PC-lab).
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	22.05.2007	09.00	100/100	D

Department of Sociology and Political Science

POL1003 Environmental Politics

Lecturer: Førsteamanuensis Jennifer Leigh Bailey
Weekly hours: Spring: 2F+2Ø = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None

Learning objectives: To improve the students? understanding of environmental politics at the national and international level.

Recommended previous knowledge: None.
Academic content: This course offers and introduction to the main theories and political processes within the field of environmental politics. The empirical focus will be on Norwegian environmental policy formation and implementation, but a few central international agreements and institutions will also be discussed. Theoretically, the emphasis will be on central theories of institutions, decision-making and collective action, which are often applied to understand the political processes of environmental policy formation. The term paper will be written as a joint project including up to four students. Deadline for term paper is May 4th. Lectures for 14 weeks.
Teaching methods and activities: Teaching methods and activities: Lectures 2 hours per week for 14 weeks and seminars. The course has a compulsory term paper. The students may write the term paper in groups of up to 4 students. Size of term paper:up to 7500 words (up to 20 pages)
Forms of assessment: A 3 hour written exam and the term paper. Each part counts half of the grade. If you fail or want to take the exam again, you have to take both parts. The language of instruction is English.
Course materials: To be decided at the start of the course.
Assessment: Assignment/Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION			1/2	
ASSIGNMENT			1/2	

POL1004 Globalization: Norway in International Society

Lecturer: NN
Weekly hours: Autumn: 2F+10S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Term paper

Learning objectives: To improve the students' understanding of the main characteristics of the economic-, political- and cultural globalization processes and how these affect the Norwegian economy, politics and culture.
Recommended previous knowledge: None.
Academic content: The students will be offered a short introduction to the literature on globalization within the fields of social economy, political science and sociology. Theoretical and conceptual dilemmas associated with globalization will also be discussed.
Teaching methods and activities: Teaching methods and activities:2 hours of lectures per week for 14 weeks and supervison of project work.
Compulsory activity: Approved term paper (3000 words/8 pages).
Form of assessment:3-hour written exam. The course is offered if available teaching resources.
Course materials: To be decided at the start of the course.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION			1/1	D

Experts in a Team

Course description for Experts in a Team will be annonced on the web: www.eit.ntnu.no.

MASTER OF PHILOSOPHY IN ENGLISH LANGUAGE AND LINGUISTICS

The Department of Modern Foreign Languages offers an international master's programme in English Language and Linguistics. The aim of the programme is to give students a deeper insight into issues such as modern English grammar and syntax, communication studies, first and second language acquisition and translation theories.

Course outline
The M.Phil. Programme requires two years of full-time studies, and starts in the autumn term (mid August). The normal workload for a full-time student for one academic year is 60 ECTS credits. The first year of the programme is devoted to a combination of courses, comprising a total of 60 ECTS credits. Of these at least 30 ECTS credits have to be from Master's level courses (courses with a 3000 code), but up to 30 credits may be obtained from advanced courses (courses with a 2000 code). Second year students are expected to work exclusively on their master's thesis, which also counts for a total of 60 ECTS credits. In the first year students may choose from the courses offered at the Department of Modern Foreign Languages or from courses offered by the Department of Language and Communcation Studies, and approved by the Department of Modern Foreign Languages.

Courses

Code	Course title	ECTS credits	Semester	Restricted admission
ENG2153	First and Second Language Acquisition	7,5	Spring	
ENG2155	Theoretical and Practical Aspects of Grammar and Translation	7,5	Autumn	
ENG3001	Theory and Method	7,5	Spring	
ENG3122	Cognitive and Theoretical Aspects of Language	15	Spring	
ENG3123	Translation	7,5	Spring	
ENG3910	Master's Thesis in English Language and Linguistics	60	Spring and autumn	*)
*) ENG3910: Requires admission to the study programme Master of Philosphy in English Language and Linguistics.				

The table below shows how a Master of Philosophy in English Language and Linguistics is usually built up:

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
Spring 4	ENG3910 Master's Thesis in English Language and Linguistics			
Autumn 3				
Spring 2	ENG3122 Cognitive and Theoretical Aspects of Language		ENG3123 Translation	ENG3001 Theory and Method
Autumn 1	LING2222 Language Typology		LING2204 Pragmatics II	ENG2155 Theoretical and Practical Aspects of Grammar and Translation

Students who want to include other courses offered by The Department of Modern Foreign Languges (see above), or from the list of courses offered at the Department of Language and Communication Studies (see below), should contact the Department of Modern Foreign Languages for further information regarding the possiblities for an individual curriculum.

Topics offered in the programme
The range of topics that could be offered includes advanced topics in modern English syntax, studies of the lexicon, first language acquisition and second language acquisition studies, translation theory and communication studies.

Courses offered by the Department of Language and Communication Studies
The following courses offered by the Department of Language and Communication Studies have been approved for use in the M.Phil. in English Language and Linguistics degree. Note that topics may vary in the course marked by an asterisk (*). Students are advised to contact the Department of Modern Foreign Languages for details before registering for this course.

Code	Course title	ECTS credits	Semester	Restricted admission
LING2204	Pragmatics II	7,5	Autumn	
LING2222	Language Typology	15	Autumn	
LING3001	Syntax and Semantics*	15	Autumn and Spring	

Teaching and exams
Normally each course has three hours of teaching per week in the form of lectures and seminars. Some individual supervision may be offered. Assessment in the ENG-courses is based on a written assignment. In addition, students are required to give oral presentations and/or complete course projects. Methods of assessment in the LING-courses vary from course to course. For more information, see the course descriptions on the web.

Supervision
The department offers supervision in the syntax/semantics of modern English to first and second language acquisition, the syntax/semantics interface and contemporary information structure theories.
The course ENG3001 *Theroy and Method* will prepare students for research in relation to their master's thesis in that they will work towards a project description for their master's thesis. The project description serves as a basis for the Head of Department's approval of an agreement on supervision between a student and a supervisor.

Field-work
After the first year of studies, during the period mid June to mid August, candidates are given the opportunity to go back to their home countries to do field-work if this is necessary for the completion of their theses. Students who are supported by the Quota Programme are awarded an extra grant to cover field-trip expenses.

Admission requirements
The programme is open to Quota Programme applicants and to applicants with other sources of financing.
Applicants should hold a B.A. or an equivalent degree in English or Linguistics with a sufficient background in topics related to English language or linguistics. Only candidates with a minimum of three English language/ linguistics courses will be considered for acceptance.
Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university education, must be submitted.
An English proficiency test must be included. Applicants must pass either the TOEFL with a minimum paper score of 550 (230 computer) or the IELTS with 6.0 or better. Citizens of Ireland, the UK, the US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in any of these countries, attending higher secondary school or university. Applicants from African countries with a B.A./B.Sc./B.Eng. degree where the language of instruction has been English and those who have passed English as a subject at GCE A-level with grade C or better are also exempted. Applicants with a university degree in English language (B.A. in English) are also exempted from the English language proficiency test requirement. Please be aware that applicants from Asian countries (for example Bangladesh, India, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) with a B.A./ B.Sc./ B.Eng. degree where the language of instruction has been English are not exempted from the English language requirements, except for candidates holding a B.A. degree in English.

Course descriptions

ENG2153 First and Second Language Acquisition

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Oral presentation, approx. 20 minutes
Recommended previous knowledge: ENG1101 or equivalent approved course.
Required previous knowledge: None
Learning objectives: To achieve an awareness of the basic issues of L1 and L2 acquisition and to be able to practically employ this knowledge.

Academic content: The course provides an introduction to First and Second language (L1 & L2) acquisition with a special focus on how theoretical knowledge of these phenomena can be employed in improving the methods for L2 instruction and for practical purposes in education and language teaching otherwise.
Course materials: Curriculum/reading list
Teaching methods and activities: Seminars, discussions and individual supervision. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

ENG2155 Theoretical and Practical Issues of English Grammar and Translation

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: ENG2152: 7.50 Cr, HFENG235: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 4 written assignments, each approx. 500 words/1-2 pages
Recommended previous knowledge: ENG1101 and ENG1201 or equivalent
Required previous knowledge: None
Learning objectives: To achieve an awareness of the basic issues of the grammar of English and ways of describing and explaining them using advanced theoretical approaches. To gain an understanding of how awareness of parametric variation in grammar can be employed to resolve issues in translation.
Academic content: The course provides an in-depth study of selected phenomena in English grammar from the point of view of state-of-the-art frameworks and approaches. In addition, the parametric variation displayed in English and Norwegian is addressed from the point of view of translation theory and practice.
Course materials: Curriculum/reading list will be available at the beginning of the semester.
Teaching methods and activities: Seminars, discussions and individual supervision. Compulsory assignments: Short assignments that must be submitted on time during the course. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

ENG3001 Theory and Method

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Pass/Fail
Compulsory assignments: 1 short written assignment (1000-1500 words/ 2-3 pages), Submitted approved reading list
Recommended previous knowledge: bachelor's Degree with specialisation in English.
Required previous knowledge: Requires admission to the Master's programme in English or to Master of Philosophy in English Language and Linguistics or to the five-year teacher education programme with a master's degree in English.
Learning objectives: To develop an academic and critical understanding of relevant theoretical and methodological issues.
Academic content: The course gives an introduction to some of the most important theories in the teaching and research into literature, language, and civilization. The students should become familiar with the different methodological approaches within the various disciplines. The course will prepare students for research in relation to their master's thesis in that they will work towards a project description for their master's thesis. Students are recommended to attend the departmental seminar for master's students.
Course materials: The reading list will be available at the beginning of the semester.
Teaching methods and activities: Seminars and exercises. Assessment: Semester assignment/term paper: 4-5 pages/2000 words.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ENG3122 Cognitive and Theoretical Aspects of Language

Teaching: Spring: 15.0 Cr
Language of instruction: English
Credit reduction: ENG3112: 15.0 Cr
Grade: Letter grade
Compulsory assignments: Oral presentation, approx. 20 minutes
Recommended previous knowledge: Undergraduate language and linguistic courses.
Required previous knowledge: None
Learning objectives: Students should gain understanding of central theories of language and how these can be explained in light of recent cognitive models.

Academic content: The course addresses language from the point of view of contemporary linguistic theory and cognitive science. Central issues of the cognitive make-up of language are addressed based in data from Modern English, with a focus on how successful the approaches discussed are at explaining the basic facts and properties of natural languages.
Course materials: The reading list will be available at the beginning of the semester.
Teaching methods and activities: Lectures/seminars. Assessment: Home exam approx. 4000 words/10-12 pages.
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

ENG3123 Translation

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Oral presentation, approx. 20 minutes
Recommended previous knowledge: Bachelor's Degree with specialisation in English or bachelor's degree in European studies and foreign languages.
Required previous knowledge: None
Learning objectives: To develop an awareness of central issues in translation both as a linguistic enterprise and as cultural practice.
Academic content: The course will focus on issues of translation from an interdiciplinary perspective. Both translation theory advances and semiotic approaches will be discussed. A central issue addressed in the course is the notion of equivalence across languages.
Course materials: The reading list will be available at the beginning of the semester.
Teaching methods and activities: Lectures/seminars. The course may be offered in collaboration with the Department of Scandinavian Studies and Comparative Literature and the Department of Language and Communication Studies. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

ENG3910 Master´s Thesis in English Language and Linguistics

Teaching: 1st sem. springr, 2nd sem. autumn: 60.0 Cr
Language of instruction: English
Credit reduction: HFENG391: 60.0 Cr
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Requires admission to the study programme, as well as a completed bachelor's degree in English language or in Linguistics, or equivalent approved education. Only candidates with a minimum of three English language/linguistics courses will be considered.
Learning objectives: The student should be able to treat a specialized topic within English language and/or lingusitics in an academic way, and present the results in English.
Academic content: An academic work of approximately 30 000 words/ 80 pages (1,5 lines spacing) on a topic within English language and/or linguistics. The thesis must be written in English.
Teaching methods and activities: Individual supervision. The grade given on the thesis may be adjusted by one grade after the oral exam (approx. 30 minutes). It is a prerequisite that the student has passed his/her master's thesis in order to present his-/herself for the oral exam.
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS		1/1	

LING2204 Pragmatics II

Teaching: Autumn: 7.50 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING206: 7.50 Cr, HFLING206A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1104 Pragmatics I.
Learning objectives: The objective is to enable the students to read original literature on pragmatic topics and to base their work with the term paper on what they have read and understood.
Academic content: This course offers an introduction to pragmatic theory with an emphasis on relevance theory. Central topics are the relationship between semantics and pragmatics, the relationship between truth-functional and non-truth-functional content, the relationship between explicit and implicit communication and the relation between descriptive and interpretative language use.

Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 8-12 typed A4 pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2222 Language Typology

Teaching: Autumn: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING214: 15.0 Cr, HFLING214A: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1102 Phonology I, LING1103 Semantics I and LING2201 Syntax II
Learning objectives: The objective is that the students get an understanding of how the morpho-syntactic construction of languages can vary typologically, and at the same time learn how grammar formalisms can be built up to reflect these variations.
Academic content: This course offers an introduction to typological traits used in the classification and analysis of the world's languages. These traits may be of a morphological, syntatic, semantic, pragmatic or phonological character, and various language areas may be emphasized. The course also teaches students to work with formal frameworks (such as LFG, HPSG) in relation to languages that contain radically different properties from what the frameworks are originally based on.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the exam. The size of the exercises must be between 6-10 typed A4-pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 10-30 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING3001 Syntax and Semantics

Teaching: Both autumn and spring: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING301: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: bachelor's degree with a Major in Linguistics, LING2201 Syntax II and LING2203 Semantics II.
Learning objectives: The objective is that the students get a sufficiently thorough introduction to a syntactic or semantic field such that they will be able to independently perform thorough studies within the field.
Academic content: This course offes a deeper introduction to fields treated in Syntax II, Language Typology or Sematics II. Topics discussed will vary from semester to semester.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to hand in the term paper. The size of the exercises must be between 10-20 typed A4-pages each (line spacing 1.5). The size of the term paper depends partly on the subject, but is usually between 15-30 typed A4-pages (line spacing 1.5).
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

MASTER OF PHILOSOPHY IN MARITIME ARCHAEOLOGY

The degree is also known as the 'International M. Phil. in Archaeology'.

Admission requirements
Applicants should hold a B.A. or an equivalent degree in Archaeology, or an equivalent degree with a sufficient emphasis on topics related to Archaeology. Candidates with an equivalent B.A. degree in Arts/Social Sciences and other relevant subjects (e.g. Geology, Geophysics, Marine Technology or Oceanography) can also apply, if the candidate has completed a satisfactory number of courses in Archaeology. Candidates must have completed at least 20 ECTS credits ("studiepoeng") of basic courses in Archaeology from NTNU, or equivalent courses (at least 1/3 of one year of full-time study). Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university, must be submitted.
An English proficiency test certificate must be included. Applicants must pass either the TOEFL with a minimum paper score of 550 (230 computer) or the IELTS with a grade of 6.0 or better. Citizens from Ireland, the UK, the US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in one of these countries, and have attended higher secondary school or university during this time. Applicants from African countries with a B.A./B.Sc./B.Eng. degree where the language of instruction has been English and those who have passed English as a subject at GCE A-level with grade C or better, are also exempted. Applicants with a university degree in English language (B.A. in English) are also exempted from the language requirement. Please be aware that applicants from Asian countries (for example Bangladesh, India, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) with a B.A./ B.Sc./ B.Eng. degree for which the language of instruction has been English are not exempted from the English language requirements, with the exception of candidates holding a B.A. degree in English.
Norwegian applicants to the international master's programmes must have passed the required exam in English language ("Engelsk grunnkurs") in the Norwegian Higher Secondary School system. Applicants from European or other industrialised countries which have ratified the Lisbon Convention, should document a minimum of seven years of English as a subject at primary and secondary school level when submitting the final application form. Applicants from some of these countries, who have less than seven years of English from primary and secondary school, must however satisfy the English test requirements (TOEFL/IELTS test with satisfactory score) mentioned above.
NB! The program is also open to non-quota program applicants.

The M.Phil. programme in Maritime Archaeology focuses on the following topics:

- Maritime Aspects of Culture: the development and scope of the subject, current research, theoretical perspectives and central issues.
- Comparative Perspectives on Maritime Cultural Landscape: interaction between land and sea in the cultural development of the world.
- Boat and Shipbuilding Technologies: materials and techniques of construction, and the major building traditions of the world, with focus on certain periods. Our main focus will be on current research projects.
- Ship Science in Archaeology: recording, reconstruction and analysis of ancient hulls.
- Seafaring in the World; covering seafaring, navigation, anchorages, harbours, trade and exchange.
- Marine Natural Resources in cultural development from a world comparative perspective.
- Underwater Cultural Heritage Management: deals with the priorities of assessing, protecting and managing underwater archaeological resources.
- Archaeological Oceanography.
- Underwater Archaeology: the application of archaeological principles in underwater environments, and associated skills – including marine archaeological field methods.
- Deep-Water Archaeology: a study program in deep-water archaeology including the use of technology and methods developed at NTNU.
- Conservation of Underwater Archaeological sites.

Course outline
The M.Phil. Programme requires two years of full-time study, and starts in the autumn term. The credits are divided between courses comprising a total of 60 credits and a thesis of 60 credits. 60 credits constitutes the normal workload for a full-time student for one academic year.

M.Phil. in Maritime Archaeology:

Semester	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits
4 Spring	ARK3095 MPhil Master's Thesis Seminar			
3 Autumn	ARK3040 Management of maritime Heritage	ARK3050 Maritime archaeological Science	ARK3095 MPhil Master's Thesis Seminar	
2 Spring	ARK3015 Maritime Culture II	ARK3025 Maritime archaeological Field Research II	ARK3030 Archaeological Oceanography	ARK3095 MPhil Master's Thesis Seminar
1 Autumn	ARK3010 Maritime Culture I		ARK3020 Maritime archaeological Field Research I	ARK3095 MPhil Master's Thesis Seminar

Teaching and exams
Each course has a take-home exam. Normally each 15 credit course has four hours of teaching per week in the form of lectures and seminars.

After the first year of studies – during the period mid June to mid August – candidates are given the opportunity to return to their home countries to do field-work if this is necessary for the completion of their theses. Students who are supported by the Quota programme are awarded an extra grant to cover field-trip expenses.

Course descriptions

ARK3010 Maritime Culture I

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Recommended previous knowledge: bachelor degree in Archaeology.
Required previous knowledge: None.
Academic content: - Development and scope of maritime archaeology, current research, theoretical perspectives and central issues. - Maritime archaeology in modern society. - Maritime cultural landscape. - Boat and shipbuilding technologies.
Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The exam is a combination of a home-exam and an oral examination. The home-exam will be maximum 4000 words long. The home-exam ande the oral examination must be passed in the same term, and one common grade is given. Deadlines for subitting written assignments
Assessment: Written assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/2	
ORAL EXAMINATION		1/2	

ARK3015 Maritime Culture II

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Required previous knowledge: ARK 3010 Maritime Culture I.
Academic content: - Seafaring and maritime infrastructures of the world. - Marine natural resources and cultural development. - Maritime symbolism.
Teaching methods and activities: The home-exam will be maximum 4000 words long. Deadlines for subitting written assignments
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3020 Maritime Archaeological Field Research I

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.

Recommended previous knowledge: bachelor degree in archaeology.
Required previous knowledge: None.
Learning objectives: Achieve basic knowledge of maritime archaeological methods on land and under water.
Academic content: - Maritime archaeology on land and under water including application of archaeological principles in underwater environments and associated skills.
Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The home-exam will be maximum 4000 words long. Information regarding time frames and deadlines for subitting written assignments is provided at the beginning of the semester.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3025 Maritime Archaeological Field Research II

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Required previous knowledge: ARK 3020 Maritime Archaeological Field Research I.
Academic content: - Marine technology. - Deep water archaeology. - Remote sensing and investigations - implications for archaeology.
Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The home-exam will be maximum 4000 words long. Information regarding time frames and deadlines for subitting written assignments is provided at the beginning of the semester.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3030 Archaeological Oceanography

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Recommended previous knowledge: bachelor degree in archaeology.
Academic content: Physics, chemistry and biology of the oceans. Sedimentation and cultural heritage. Obstruction processes and implications for achaeology.
Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The home-exam will be maximum 4000 words long. Information regarding time frames and deadlines for subitting written assignments is provided at the beginning of the semester.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3040 Management of Maritime heritage

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Recommended previous knowledge: bachelor degree in archaeology.
Academic content: - National and international management systems. - Maritime heritage and the public.
Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The home-exam will be maximum 4000 words long. Information regarding time frames and deadlines for subitting written assignments is provided at the beginning of the semester.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3050 Maritime Archaeological Science

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Lectures, seminars.
Recommended previous knowledge: bachelor degree in archaeology.
Academic content: - Preservation. - Dating. - Measurements and reconstructions.

Teaching methods and activities: In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities (lectures and seminars). The home-exam will be maximum 4000 words long. Information regarding time frames and deadlines for subitting written assignments is provided at the beginning of the semester.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3095 MPhil Master's thesis

Teaching: Both autumn and spring: 60.0 Cr
Grade: Letter grade
Compulsory assignments:
Required previous knowledge: Admission to the MPhil-programme in maritime archaeology is required.
Learning objectives: Students should learn to perform an archaeological analysis and develop and write an academic paper.
Academic content: The course covers the development of a project description, and on the basis of this, the writing of a Master's thesis. The topic for the thesis is chosen in collaboration with the department, usually within one of the department's project programmes. The thesis should be the equivalent of two semesters' workload. It should be 60-80 pages long, A4 format, with 2.5cm margins, 1.5 line spacing and 12 point Times New Roman font (approximately 21,000-28,000 words). The table of contents, illustrations, acknowledgements, literature list and a possible appendix are counted in addition to this. If the length of the thesis significantly exceeds the norm, it will have to be approved by the advisor.
Teaching methods and activities: Participation requires acceptation into the Master's programme in Archaeological research. Assessment form: A grade evaluation of the Master's thesis in combination with an oral examination. The oral exam will consist of the student's presentation of the thesis, followed by a discussion of the thesis between the censors and the student.
A preliminary grade is set on the basis of the written work. The oral exam can be used to adjust the final grade. In order to be able to sit the final exam, the student must participate in a minimum of 70 percent of all obligatory activities.
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS		1/1	

MASTER OF PHILOSOPHY IN LINGUISTICS

This degree is also known as the 'International M.Phil in Linguistics'.

Admission requirements
Applicants should hold a B.A. or equivalent degree in Linguistics or an equivalent degree with a sufficient emphasis on topics related to Linguistics. Only candidates with a minimum of three Linguistics courses will be considered.
Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university education, must be submitted.
An English proficiency test result must be included. Applicants must pass either the TOEFL with a minimum paper score of 550 (230 computer) or the IELTS with a mark of 6.0 or better. Citizens of Ireland, the UK, the US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in one of these countries, and who have attended higher secondary school or university there. Applicants from African countries with a BA/BSc/BEng degree for which the language of instruction has been English, and those who have passed English as a subject at GCE A-level with grade C or better, are also exempted from the language requirement. Applicants with a university degree in English language (BA in English) are also exempted from the language requirement. Please be aware that applicants from Asian countries (for example Bangladesh, India, Nepal, Pakistan, Sri Lanka, Thailand, and Vietnam) with a BA/BSc/BEng degree for which the language of instruction has been English are not exempted from the English language requirement, except for candidates holding a BA degree in English.
NB! The Programme is also open to non-quota programme applicants.

Course outline
The M.Phil. Programme requires two years of full-time study, and starts in the autumn term. The ECTS credits are divided between courses comprising of a total of 75 ECTS credits, and a thesis of 45 ECTS credits. 60 ECTS credits represents the normal workload for a full-time student for one academic year. The courses may include both intermediate courses (LING2xxx courses) and master's courses (LING3xxx courses) of the candidate’s choice from the first table below, in addition to maximum one of the interdisciplinary topics listed in the second table below. At least 15 ECTS credits must have a course code LING3xxx (master's level). The courses are selected from those offered to regular students in the department. It is expected that the second semester of the second year shall be devoted exclusively to work on the master’s thesis.

Topics offered in the programme
The range of topics that may be offered represents a subset of the topics offered in the regular Bachelor's and Master's Programmes in Linguistics, namely:

Course code	Course title	ECTS credits	Semester	Restricted admission
LING2201	Syntax II	7.5	Spring	
LING2202	Phonology II	7.5	Autumn	
LING2203	Semantics II	7.5	Spring *)	
LING2204	Pragmatics II	7.5	Autumn	
LING2206	Computational Linguistics I	7.5	Spring	
LING2207	Grammar Engineering I	7.5	Spring *)	
LING2216	Computational Linguistics II	7.5	Autumn	
LING2217	Grammar Engineering II	7,5	Spring *)	
LING2221	Intonation	15	Autumn *)	
LING2222	Language Typology	15	Autumn	
LING3001	Syntax and Semantics	15	Autumn and Spring *)	
LING3003	Pragmatics III	15	Spring *)	
LING3005	Grammar Engineering III	15	Autumn *)	
LING3006	Phonology III	15	Spring *)	
LING3392	M.Phil. Thesis in Linguistics	45	Autumn and Spring	**)
*) The courses offered may vary. Contact the department for more information prior to semester start.				
**) LING3392: Requires admission to the study programme Master of Philosophy in Linguistics.				

Interdisciplinary topics
The following courses are approved in an M.Phil. in Linguistics. Maximum one of the following topics may be admitted in the degree. More information about the topics is to be found in the respective curricula.

Course code	Course title	ECTS credits	Semester	Restricted admission
FON1101	Introduction to Phonetics	15	Autumn	
FON2205	Transcription	7.5	Autumn/Spring	
ENG2153	First and Second Language Acquisition	7.5	Spring	
ENG3122	Cognitive and Theoretical Aspects of Language	15	Spring	

M.Phil. in Linguistics: Example with emphasis on grammar and pragmatics

Semester	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits
Spring 4	LING3392 M.Phil Thesis			
Autumn 3	LING3392 M.Phil Thesis		LING3001 Syntax and Semantics	
Spring 2	LING2201 Syntax II	LING2203 Semantics II	LING3003 Pragmatics III	
Autumn 1	LING2202 Phonology II	LING2204 Pragmatics II	LING2222 Language Typology	

M.Phil. in Linguistics: Example with emphasis on phonology and pragmatics

Semester	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits
Spring 4	LING3392 M.Phil Thesis			
Autumn 3	LING3392 M.Phil Thesis		LING2221 Intonation	
Spring 2	LING3003 Pragmatics III		LING3006 Phonology III	
Autumn 1	LING2202 Phonology II	LING2204 Pragmatics II	LING2222 Language Typology	

M.Phil. in Linguistics: Example with emphasis on syntax and semantics

Semester	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits	7,5 ECTS credits
Spring 4	LING3392 M.Phil Thesis			
Autumn 3	LING3392 M.Phil Thesis		LING3001 Syntax and Semantics	
Spring 2	LING2217 Grammar Engineering II	LING2203 Semantics II	LING2207 Grammar Engineering I	LING2201 Syntax II
Autumn 1	LING2202 Phonology II	LING2204 Pragmatics II	LING2222 Language Typology	

Teaching and exams
Each course, whether intermediate or master's, has a home exam, (one week for 7.5 ECTS credits and two weeks for 15 ECTS credits). Normally each 15 ECTS credit course has four hours of teaching per week in the form of lectures and seminars.
After the first year of study, during the period mid June to mid August, the candidates are given the opportunity to return to their home countries to do fieldwork if this is necessary for the completion of their theses. Students who are supported by the Quota programme are awarded an extra grant to cover field-trip expenses.

Course descriptions

LING2201 Syntax II
Teaching: Spring: 7.50 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING203: 7.50 Cr, HFLING203A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1101 Syntax I.
Learning objectives: The objective is that the students actively can apply a formal syntactic theory, regardless of the typological classification of the languages described.

Academic content: Course instruction is based on the frameworks Head-Driven Phrase Structure Grammar (HPSG) and Lexical Functional Grammar (LFG). The course offers an introduction to the use of computational platforms adjusted to these two frameworks.
Teaching methods and activities: Lectures and group instructions.
More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 6-10 typed A4-pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2202 Phonology II

Teaching: Autumn: 7.50 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING204: 7.50 Cr, HFLING204A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1102 Phonology I.
Learning objectives: The objective is to give the students insight in the use of phonological models, so that they can analyse phonological data from their native language in accordance with the chosen model.
Academic content: This course continues the department's introduction to phonology with special emphasis on the presumed universal traits of syllable and sound structures. The most current models of phonological analysis will be used. The relationship between phonological form and its phonetic realization is central to the coursework.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 8-12 typed A4 pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2203 Semantics II

Teaching: Spring: 7.50 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING205: 7.50 Cr, HFLING205A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 4 approved exercises with supervision
Recommended previous knowledge: LING1103 Semantics I.
Learning objectives: The objective is that the students actively can apply a formal semantic theory on a language, regardless of the typological classification of that language.
Academic content: This course offers an introduction to formal as well as computationally oriented semantics, including Minimal Recursion Semantics and systems based on conceptual semantics.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 6-10 typed A4 pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2204 Pragmatics II

Teaching: Autumn: 7.50 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING206: 7.50 Cr, HFLING206A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1104 Pragmatics I.
Learning objectives: The objective is to enable the students to read original literature on pragmatic topics and to base their work with the term paper on what they have read and understood.
Academic content: This course offers an introduction to pragmatic theory with an emphasis on relevance theory. Central topics are the relationship between semantics and pragmatics, the relationship between truth-functional and non-truth-functional content, the relationship between explicit and implicit communication and the relation between descriptive and interpretative language use.

Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 8-12 typed A4 pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2206 Computational Linguistics I

Teaching: Spring: 7.50 Cr
Language of instruction: English, Norwegian
Credit reduction: HFLING215: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: EXFAC0003 Language and Literature, EXFAC0006 Introduction to Informatics, Language and Culture, or equivalent.
Learning objectives: The students will acquire knowledge of basic theories and methods in rule-based computational language analysis.
Academic content: This topic offers an introduction to rule-based strategies in language technology, including finite state machines, formal grammars, parsing algorithms, unification-based formalisms and their relation to technological systems like machine translation. A basic introduction to programming will be provided if necessary.
Teaching methods and activities: Lectures, group instructions and laboratory work. More on assessment: Obligatory exercises must be approved before students are allowed to take the take-home exam. The size of the exercises must be between 3-5 typed A4-pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2207 Grammar Engineering I

Teaching: Spring: 7.50 Cr
Language of instruction: Norwegian, English
Grade: Letter grade
Compulsory assignments: 3 approved laboratory exercises with written remarks
Recommended previous knowledge: LING1101 Syntax I, LING1103 Semantics I, LING2201 Syntax II and LING2203 Semantics II.
Learning objectives: The objective is that the students can use a grammar engineering platform (like LKB or XLE) for the coding of elementary lexical, morphological and syntactic operations, and get an understanding of the computational linguistic assumptions underlying the coding and its processing.
Academic content: This course offers an introduction to computational coding of grammatical information. The course includes an elementary introduction to general parsing and generating algorithms, and training in the use of a computational platform, such as LKB or XLE, applied to simple grammar fragments.
Teaching methods and activities: Lectures, group instructions and laboratory work. More on assessment: Obligatory exercises must be approved before students are allowed take the exam. The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2216 Computational Linguistics II

Teaching: Autumn: 7.50 Cr
Language of instruction: English, Norwegian
Credit reduction: HFLING215: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING2206 Computational Linguistics I, TMA4240 Statistics, or equivalent.
Learning objectives: Students will learn about statistical approaches to automatic language processing.
Academic content: This course emphasises statistically based machine engineering techniques with examples primarily from speech tagging and automatic translation. Combinations of rule-based and probability-based techniques are also discussed.
Teaching methods and activities: Lectures, group instructions and laboratory work. More on assessment: Obligatory exercises must be approved before the student is admitted to take the exam. The size of the exercises must be between 3-5 typed A4-pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4 pages (line spacing 1.5).

Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2217 Grammar Engineering II

Teaching: Spring: 7.50 Cr
Language of instruction: Norwegian, English
Grade: Letter grade
Compulsory assignments: 3 approved laboratory exercises with written remarks
Recommended previous knowledge: LING1101 Syntax I, LING1103 Semantics I, LING2201 Syntax II, LING2203 Semantics II and LING2207 Grammar Engineering I.
Learning objectives: The objective is that the students can use a grammar engineering platform (like LKB or XLE) for the coding of lexical, morphological and syntactic operations beyond the most elementary ones, and especially that they can integrate semantic information into a grammar.
Academic content: This course is a direct continuation of Grammar Engineering I, increasing in a stepwise fashion the range of grammatical and semantic phenomena as implemented on the selected developmental platform, so that the student is eventually able to model most kinds of phenomena using the platform.
Teaching methods and activities: Lectures, group instructions and laboratory work. More on assessment: Obligatory exercises must be approved before students are allowed to take the exam. The size of the take-home exam depends partly on the subject, but is usually between 8-15 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2221 Intonation

Teaching: Autumn: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING209: 15.0 Cr, HFLING209A: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING2202 Phonology II, LING2204 Pragmatics II.
Learning objectives: The objective is to increase the student's awareness of the importance of intonation and other prosodic features in spoken communication and of how intonation interacts with a series of other linguistic features in conversation.
Academic content: This course offers an introduction to models of describing sentence intonation, and looks at elements of syntax, semantics and pragmatics that may influence the fundamental frequency patterns in Norwegian utterances. A central theme is the importance of intonation in the nexus between phonetics, phonology, syntax and pragmatics. The course places emphasis on the way intonation creates context for the listener. This is a prerequisite for the understanding of the total content of the utterance. The relationship between word prosody (especially stress and word accent) and utterance prosody (intonation) is central to the course.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the exam. The size of the exercises must be between 12-15 typed A4-pages each (line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 10-30 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING2222 Language Typology

Teaching: Autumn: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING214: 15.0 Cr, HFLING214A: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: LING1102 Phonology I, LING1103 Semantics I and LING2201 Syntax II
Learning objectives: The objective is that the students get an understanding of how the morpho-syntactic construction of languages can vary typologically, and at the same time learn how grammar formalisms can be built up to reflect these variations.
Academic content: This course offers an introduction to typological traits used in the classification and analysis of the world's languages. These traits may be of a morphological, syntatic, semantic, pragmatic or phonological character, and various language areas may be emphasized. The course also teaches students to work with formal frameworks (such as LFG, HPSG) in relation to languages that contain radically different properties from what the frameworks are originally based on.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to take the exam. The size of the exercises must be between 6-10 typed A4-pages each

(line spacing 1.5). The size of the take-home exam depends partly on the subject, but is usually between 10-30 typed A4-pages (line spacing 1.5).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

LING3001 Syntax and Semantics

Teaching: Both autumn and spring: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING301: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision
Recommended previous knowledge: bachelor's degree with a Major in Linguistics, LING2201 Syntax II and LING2203 Semantics II.
Learning objectives: The objective is that the students get a sufficiently thorough introduction to a syntactic or semantic field such that they will be able to independently perform thorough studies within the field.
Academic content: This course offes a deeper introduction to fields treated in Syntax II, Language Typology or Sematics II. Topics discussed will vary from semester to semester.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercises must be approved before students are allowed to hand in the term paper. The size of the exercises must be between 10-20 typed A4-pages each (line spacing 1.5). The size of the term paper depends partly on the subject, but is usually between 15-30 typed A4-pages (line spacing 1.5).
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3003 Pragmatics III

Teaching: Spring: 15.0 Cr
Language of instruction: Norwegian, English
Credit reduction: HFLING303: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3 approved exercises with supervision, approved oral presentation
Recommended previous knowledge: bachelor's degree with a Major in Linguistics, LING1104 Pragmatics I and LING2204 Pragmatics II.
Learning objectives: The objective is to prepare students so that they are able to carry out the research work that goes into writing of a Master's thesis on a pragmatic topic.
Academic content: This course consists of reading and assessing newer original literature in pragmatic theory.
Teaching methods and activities: Lectures and group instructions. More on assessment: Obligatory exercices and oral presentation must be approved before students are allowed to hand in the term paper. The size of the exercises must be between 12-15 typed A4-pages each (line spacing 1.5). The size of the term paper depends partly on the subject, but is usually between 15-30 typed A4-pages (line spacing 1.5).
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3005 Grammar Engineering III

Teaching: Autumn: 15.0 Cr
Language of instruction: Norwegian, English
Grade: Letter grade
Compulsory assignments: 3 approved laboratory exercises with written remarks
Recommended previous knowledge: bachelor's degree with a Major in Linguistics, LING2217 Grammar Engineering II.
Learning objectives: The objective is that the students are sufficiently trained in grammar engineering to independently perform the construction of a medium-sized grammar.
Academic content: This course offers an introduction to the development of a "core grammar", or a computational grammar where there is core-selection of the phenomena that together make up a grammar. (Phenomena treated in Grammar Engineering II will serve as a part of the integrated system. Students are encouraged to work with languages for which there has not already been developed a core grammar, but this is not a condition for language choice.)
Teaching methods and activities: Lectures, group instructions and laboratory work. More on assessment: Obligatory exercises must be approved before students are allowed to hand in the term paper. The size of the written remarks must be between 6-10 typed A4-pages each (line spacing 1.5). The size of the term paper depends partly on the subject, but is usually between 15-30 typed A4-pages (line spacing 1.5).

Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3006 Phonology III

Teaching: Spring: 15.0 Cr
Language of instruction: English, Norwegian
Credit reduction: HFLING302: 15.0 Cr
Grade: Letter grade
Compulsory assignments: Approved oral presentation
Recommended previous knowledge: bachelor's degree with a Major in Linguistics, LING1102 Phonology I and LING2202 Phonology II.
Learning objectives: The objective is to prepare students on a theoretical and practical basis so that they are able to carry out the research work that goes into writing a Master's thesis on a phonological topic.
Academic content: This course consists of reading and assessing literature pertaining to phonological theory and analysis.
Teaching methods and activities: Lectures and group instructions.
More on assessment: Obligatory oral presentation must be approved before students are allowed to hand in the term paper. The size of the term paper depends partly on the subject, but is usually between 15-30 typed A4-pages (line spacing 1.5).
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3392 M.Phil. Thesis in Linguistics

Teaching: 1st sem. autumn, 2nd sem. spring: 45.0 Cr
Credit reduction: HFLING391: 45.0 Cr, HFLING390: 45.0 Cr, LING3390: 45.0 Cr, LING3391: 45.0 Cr
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Requires admission to the M.phil. programme in linguistics.
Learning objectives: The goal is to make students capable of both conducting independent research under supervision, and enabling the students to document their ability to do research that meets the requirements of scientific publishing.
Academic content: Starting point: The Master's Thesis is an independent scientific work performed under supervision. Content: Normally, the thesis is thematically connected to one of the master subjects. A plan for the thesis is to be set up together with one of the instructors in the department, normally the person who will be acting as supervisor. The plan (stating theme, central problem and method) must be approved by the department, and a supervisor must be appointed before starting the work.
Teaching methods and activities: Independent work with supervision. The thesis is normally at least 50 typed A4-pages (line spacing 1.5). Joint work can be approved as a Master's Thesis if each contribution is clearly marked and if each contribution is equivalent to a normal Master's Thesis with respect to amount of work and size. Assessment includes the thesis and a final oral exam. The oral exam will affect the grade on the thesis.
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS		1/1	

FON1101 Introduction to Phonetics

Teaching: Autumn: 15.0 Cr
Language of instruction: English, Norwegian
Credit reduction: HFFON101: 15.0 Cr
Grade: Letter grade
Compulsory assignments: 3-5 laboratory exercises, 3 written submissions
Recommended previous knowledge: EXFAC0003 Language and Literature
Learning objectives: This course gives an introduction to the field of phonetics. The goal of the course is for students to train their articulatory and auditory skills as well as to get acquainted with instrumental analysis of speech.
Academic content: This course offers an introduction to this scientific field by placing the subject in a historical context and describing it in relation to similar subjects within the linguistic field. The role of phonetics in speech synthesis and speech recognition is also a focus of the course. Students will develop their articulatory and auditory skills using the International Phonetic Alphabet (IPA). Through a number of laboratory exercises, students will have their first encounter with both the content and method of experimental work in this field of study.
Teaching methods and activities: Lectures, group instructions and laboratory exercises with supervision. Assessment: Oral test and a portfolio consisting of three written papers. More on assessment: Mandatory exercises must be approved before the final grade is given. The size of the 3 written submissions in the portfolio must be between 3-7 typed A4-pages each (line spacing 1.5), depending on type of assignment. Each of the portfolio papers will be considered individually, but the grade given is based on an overall assessment. The portfolio and the oral test is weighted 50-50. Both the oral test and the portfolio need to be approved in order to pass the course. In case of failure, all components must be repeated.

Assessment: Oral examination/Written work

Forms of assessment	Time	Percentage	Deadline
ORAL EXAMINATION		1/2	
PORTFOLIO ASSESSMENT		1/2	

FON2205 Transcription

Teaching: Both autumn and spring: 7.50 Cr
Language of instruction: English, Norwegian
Credit reduction: HFFON205: 7.50 Cr
Grade: Letter grade
Compulsory assignments: 3 transcription exercises
Recommended previous knowledge: FON1101 Introduction to Phonetics or equivalent background.
Learning objectives: Through this course the students will be enabled to enlarge their basic skills in the auditory analysis of speech.
Academic content: This course builds on the auditory skills acquired in FON1101, and will deal with transcription of longer texts. The texts used are chosen from speech material in Norwegian and possibly other European languages produced in different styles.
Teaching methods and activities: Lectures, group instructions and exercises with supervision. Assessment: Oral exam and portfolio containing two written assignments.
More on assessment: The mandatory transcriptions have to be approved before the student may sit the exam. The two written assignments in the portfolio are two of the mandatory exercises. Each of the portfolio papers will be considered individually, but the grade given is based on a total impression. The portfolio and the oral test are weighted 50-50. Both the oral test and the portfolio need to be approved in order to pass the course. In case of failure, all components must be repeated.
Assessment: Oral examination/Written work

Forms of assessment	Time	Percentage	Deadline
ORAL EXAMINATION	40.0 Minutes	1/2	
PORTFOLIO ASSESSMENT		1/2	

ENG2153 First and Second Language Acquisition

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Oral presentation, approx. 20 minutes
Recommended previous knowledge: ENG1101 or equivalent approved course.
Required previous knowledge: None
Learning objectives: To achieve an awareness of the basic issues of L1 and L2 acquisition and to be able to practically employ this knowledge.
Academic content: The course provides an introduction to First and Second language (L1 & L2) acquisition with a special focus on how theoretical knowledge of these phenomena can be employed in improving the methods for L2 instruction and for practical purposes in education and language teaching otherwise.
Course materials: Curriculum/reading list
Teaching methods and activities: Seminars, discussions and individual supervision. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

ENG3122 Cognitive and Theoretical Aspects of Language

Teaching: Spring: 15.0 Cr
Language of instruction: English
Credit reduction: ENG3112: 15.0 Cr
Grade: Letter grade
Compulsory assignments: Oral presentation, approx. 20 minutes
Recommended previous knowledge: Undergraduate language and linguistic courses.
Required previous knowledge: None
Learning objectives: Students should gain understanding of central theories of language and how these can be explained in light of recent cognitive models.
Academic content: The course addresses language from the point of view of contemporary linguistic theory and cognitive science. Central issues of the cognitive make-up of language are addressed based in data from Modern English, with a focus on how successful the approaches discussed are at explaining the basic facts and properties of natural languages.
Course materials: The reading list will be available at the beginning of the semester.
Teaching methods and activities: Lectures/seminars. Assessment: Home exam approx. 4000 words/10-12 pages.

Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

MASTER IN APPLIED ETHICS

Course outline

Applied Ethics is a growing, interdisciplinary field of study dealing with ethical problems in different areas of society. In Applied Ethics the aims of, and problems in, special fields of human activity such as business, politics, technology and medicine are analysed from an ethical point of view. From the perspective of ethics, Applied Ethics is a specialisation in one area of ethics. From the perspective of social practice, applying ethics involves focusing on the ethical aspects and ethical implications of that particular practice.

The field of Applied Ethics is so broad and expanding that it is virtually impossible for any one institution to offer expertise and professional guidance for thorough research in every field of specialisation. The formation of a consortium of four universities broadens the potential research base for students, and provides an opportunity for specialisation on the basis of both competence and interest.

The Master in Applied Ethics (MAE) is open to students with a bachelor's degree with a specialisation/major in ethics, or students who have completed a programme of professional study. Deliberately integrating these diverse categories of students is part of the learning experience. The MAE curriculum has been designed to be flexible in order to fulfil the demands of both categories of student, with options that fit the specific needs, strengths and weaknesses of both student groups.

The programme covers two semesters of full-time study (60 ECTS credits). The first semester comprises different courses in applied ethics offered by the collaborating institutions. The second semester comprises either a combination of courses in applied ethics and a master's thesis, or a full semester devoted solely to a master's thesis.

Courses in different areas of Applied Ethics are offered by the different institutions, according to their respective academic strengths and expertise. Hence, a student with an interest in, for instance, bioethics will take the course *Bioethics* offered in Linköping, or the course in *Animal and Nature Ethics* offered in Utrecht. During the second semester he or she can then write their master's thesis in Linköping or Utrecht under the supervision of the professor of bioethics at either institution. However, in order to increase flexibility and possible options it is also possible for the student to take a course at one university and then to move to another university for his or her thesis work.

The MAE offers students different options depending on their educational background and interests. Students with an academic background in ethics, with a specialisation/major in, for example, ethics, philosophy or religious studies, can either take courses in applied ethics (approx. 30 ECTS credits), and write a 30 ECTS credit master's thesis, or take courses with a combined scope of 45 ECTS and write a master's thesis of 15 ECTS. In order to acquire sufficient competence in ethics and applied ethics, students with a professional background must take courses comprising 45 ECTS credits and write a master's thesis of 15 ECTS.

Student mobility

Since each collaborating institution offers at least 75 percent of a full programme of relevant courses, students are offered plenty of possibilities for mobility within the MAE. First, all students are gathered together for the introductory course at one of the four participating universities. Then, student mobility will be determined by students' choice of courses, with the restriction that at least one of the courses chosen must be carried out at a second institution. Students are recommended to write their master's thesis at the same institution in which they take at least one of the courses.

Aims and learning outcomes

The objective of the master's programme in Applied Ethics is to create and develop ethical reflection and ethical competence, both of which should combine relevant theoretical and practical knowledge, understanding, and evaluation. More specifically, the aim is to achieve competence in:

Identifying and analysing moral problems in different social and professional contexts

Contributing in a sound and responsible manner to public debates on moral issues, and being able to structure and evaluate these debates

Formulating theory-based policy recommendations and assessments regarding moral issues in specific practices (e.g., health care, law, business, ICT or journalism)

Organising constructive ethical deliberation in institutional and professional contexts.

In this way, the programme will enhance the quality of applied ethics as an academic field. Furthermore, it will be instrumental in focusing on the ethical aspects of medicine, technology, politics and business and, hence improve the quality of these practices on a European level.

The MAE leads both to the acquisition of professional competence and also provides a valuable learning experience in its own right.

It provides students with a professional competence in applied and professional ethics and

It develop students' knowledge of and ability for critical reflection on pertinent moral problems in modern society.

The learning outcomes of a master's course in applied ethics are manifold. Students acquire knowledge of the history of ethics and applied ethics. They also learn about different fields of applied ethics. Furthermore, they learn

how to identify a moral issue and they acquire the methodological competence to analyse and solve moral problems. Through thesis work, students learn how to delimit, plan, carry through and present an analysis in applied ethics.

Courses

Course code	Course title	Credits	Semester	Restricted admission
FI5201	Multicultural Conflicts and Ethics	15	Autumn	Yes
FI5202	Master's Thesis in Applied Ethics	30	Spring	Yes
FI5203	Master's Thesis in Applied Ethics	15	Spring	Yes
FI5204	Reading Course in Applied Ethics	15	Spring	Yes
FI5205	Corporate responsibility and ethics	15	Autumn	Yes
FI5206	Technology for a good society	15	Autumn	Yes

Teaching and exams

Courses are examined by means of a variety of written assignments that are complemented by oral and written tests. The essays are assessed by the teacher and an external examiner appointed from any one of the other partner institutions. In the case of the master's thesis, a final presentation and defence before a discussant and examining committee is required in order to obtain a master's degree. An examination committee, consisting of teachers from the partner institutions, will assess the quality of the thesis and will decide the grade awarded.
Students who have failed an examination are normally allowed to retake it. Students who have failed a thesis examination will normally be given a chance to improve the thesis and re-present it later. However, this possibility is subject to different the national laws relating to universities and colleges in the different countries concerned, as well as to the specific study regulations in force at the collaborating institutions.

Admission requirements

Applicants must satisfy the following general admission requirements:
Officially certified copies of all educational certificates, including transcripts and diplomas from secondary school and university education, must be submitted.
Minimum formal requirements for admission to the MAE programme are either a completed bachelor's degree or equivalent approved education, or a completed programme of professional study. In both cases at least three years of full-time study is required. Applicants must submit a paper in which they demonstrate their basic knowledge of, and their affinity to, ethical questions. Students who do not have English as their first language must document their proficiency in English by submitting results from a TOEFL test with a minimum score result of 213/550, or another internationally recognised test. The main selection criteria will be the quality of the student's previous work in ethics and his or her previous professional experience. Utrecht University will charge tuition fees.

Course descriptions

FI5201 Multicultural Conflicts and Ethics

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: At least 75% attendance to the guidance
Required previous knowledge: Addmitted to the Erasmus Mundus programme "Master in Applied Ethics".
Learning objectives: The learning outcomes of a master's course in applied ethics are manifold. Students acquire knowledge of the history of ethics and applied ethics. They also learn about different fields of applied ethics. Further, they learn how to identify a moral issue and achieve methodological competence for analysing and solving moral problems. Through thesis work, the students learn how to delimit, plan, carry through and present an analysis in applied ethics.
Academic content: Multicultural conflicts might be viewed in the light of global traits of modern societies. On the one hand, modern societies are getting more open and more democratic compared to earlier times; on the other hand, there are also many signs of closure that might be envisaged as different kinds of fundamentalism. Cultures gradually become more integrated, and at the same time conflicts between them are escalating. An important aim of this course is to discuss multicultural conflicts in a philosophical and ethical perspective, from the background of different ethical positions (liberalism, communitarianism, discourse ethics).
Course materials: The curriculum/reading list is available from the Department office.
Teaching methods and activities: Lectures, seminars and self-study. Attendance (75%) must be approved to take the exam. Practical information regarding the essay: Date for submission is given under the examination dates. Two hard copies before 2 p.m. to the Department Office. Length: 15-20 pages using 12-point Times New Roman, 1.5 line spacing. Front page: Course code, date, student id. The oral exam will have a duration of approximately 40 minutes.

Assessment: Written assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		6/10	
ORAL EXAMINATION		4/10	

FI5202 Master's thesis in Applied Ethics

Teaching: Spring: 30.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Addmitted to the Erasmus Mundus programme "Master in applied Ethics".
Learning objectives: The learning outcomes of a master's course in applied ethics are manifold. Students acquire knowledge of the history of ethics and applied ethics. They also learn about different fields of applied ethics. Further, they learn how to identify a moral issue and achieve methodological competence for analysing and solving moral problems. Through thesis work, the students learn how to delimit, plan, carry through and present an analysis in applied ethics.
Academic content: In the second semester, students concentrate on a selected area of specialisation, conducting supervised thesis research leading to the completion of a master's thesis. Parallel to this the students take part in advanced seminars in ethics. The thesis is to be completed over a period of twenty weeks. At the end of the semester the thesis will be presented and defended at a seminar. The host university is responsible for teaching and tutoring. The language of the thesis is English.
Course materials: The curriculum/reading list is available from the Department office.
Teaching methods and activities: Seminars/lectures and self-study.
The essay should have a total length of 20-30 pages using 12-point Times New Roman, 1.5 line spacing. Front cover must contain the following information: Course code, date of admission and your NTNU student number. The oral exam will have a duration of approximately 40 minutes.
Assessment: Assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
THESIS		8/10	
ORAL EXAMINATION		2/10	

FI5203 Master's thesis in Applied Ethics

Teaching: Spring: 15.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Addmitted to the Erasmus Mundus programme "Master in applied Ethics".
Learning objectives: The learning outcomes of a master's course in applied ethics are manifold. Students acquire knowledge of the history of ethics and applied ethics. They also learn about different fields of applied ethics. Further, they learn how to identify a moral issue and achieve methodological competence for analysing and solving moral problems. Through thesis work, the students learn how to delimit, plan, carry through and present an analysis in applied ethics.
Academic content: In the second semester, students concentrate on a selected area of specialisation, conducting supervised thesis research leading to the completion of a master's thesis. Parallel to this the students take part in advanced seminars in ethics. The thesis is to be completed over a period of twenty weeks. At the end of the semester the thesis will be presented and defended at a seminar. The host university is responsible for teaching and tutoring. The language of the thesis is English.
Course materials: The curriculum/reading list is available from the Department office.
Teaching methods and activities: Seminars/lectures and self-study.
The essay should have a total length of 15-20 pages using 12-point Times New Roman, 1.5 line spacing. Front cover must contain the following information: Course code, date of admission and your NTNU student number. The oral exam will have a duration of approximately 40 minutes.
Assessment: Assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
THESIS		8/10	
ORAL EXAMINATION		2/10	

FI5204 Reading Course in Applied Ethics

Teaching: Spring: 15.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Addmitted to the Erasmus Mundus programme "Master in applied Ethics".
Learning objectives: The learning outcomes of a master's course in applied ethics are manifold. Students acquire knowledge of the history of ethics and applied ethics. They also learn about different fields of applied ethics. Further, they learn how to identify a moral issue and achieve methodological competence for analysing and solving moral problems. Through thesis work, the students learn how to delimit, plan, carry through and present an analysis in applied ethics.

Academic content: In the second semester, students concentrate on a selected area of specialisation, conducting supervised thesis research leading to the completion of a master's thesis. Parallel to this the students take part in advanced seminars in ethics. The thesis is to be completed over a period of twenty weeks. At the end of the semester the thesis will be presented and defended at a seminar. The host university is responsible for teaching and tutoring. The language of the thesis is English.
Course materials: The curriculum/reading list is available from the Department office.
Teaching methods and activities: Seminars/lectures and self-study.
The essay should have a total length of 15-20 pages using 12-point Times New Roman, 1.5 line spacing. Front cover must contain the following information: Course code, date of admission and your NTNU student number. The oral exam will have a duration of approximately 40 minutes.
Assessment: Written assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		6/10	
ORAL EXAMINATION		4/10	

MASTER OF PHILOSOPHY IN DEVELOPMENT STUDIES, SPECIALISING IN GEOGRAPHY

Approved by the Board at NTNU 16. December 2002, with changes made by the Faculty of Social Sciences and Technology Management 14. February 2006.

The Master in Development Studies is a programme designed for students who want to specialise in development studies and social change. The degree is awarded by the Faculty of Social Sciences and Technology Management at NTNU and administered by the Department of Geography. It has a stronger focus on Geography than on other social sciences, but is still an interdisciplinary degree that is relevant for students with backgrounds in different social sciences and development studies.
The programme is relevant for a variety of jobs, including research, planning, resource management, and teaching. The programme is also relevant for further studies within the field of Geography, other social sciences, and interdisciplinary studies such as development studies and natural resource management.
The programme is open to both foreign and Norwegian students. There are 7 places for students financed by the Quota programme, 4 for students financed by NORAD, 5 places for Norwegian students, and up to 4 places open for other exchange students.

Admission requirements
Applicants should preferably hold a Bachelor in Geography, a Cand.mag. with Geography ”mellomfag” from a Norwegian university, or other equivalent education. Candidates with a bachelor/Cand.mag.-degree in other social sciences are also considered for admission, if their first degree includes studies within Geography or Development studies.
The teaching language is English, and the applicants must document their English proficiency by achieving one of the following:
”Pass in the foundation course (“grunnkurs”) in English at a Norwegian Upper Secondary School.
TOEFL-test with a minimum of 550 points. (213 computer based test)
IELTS-test with 6.0 points or better
Exceptions from this requirement can be given for certain groups of applicants under the guidelines determined by the Faculty.

Course outline
The programme involves 2 years of full-time studies. The programme is structured around core courses (37,5 credits), electives (37,5 credits) and a Master’s thesis (45 credits).
The core courses are: GEO3050 Theories of Social Change, Experts in Team (EiT) and GEOG3052 Research Methodology.
Students can choose electives worth 37,5 credits from a number of courses offered by the Department of Geography and other departments. Most of the electives will be offered in the autumn term. Courses other than those listed below can be chosen as electives if approval is given by the Department of Geography.

Core Course:

Code	Title	Cr	Term	Restricted admission
GEOG3050	Theories of Social Change	15	Autumn /Spring	No
GEOG3052	Research Methodology	15	Spring	No
EiT	Experts in Team	7,5	Spring	
GEOG3920	Master’s Thesis	45	Autumn /Spring	Yes

Electives:

Code	Title	Cr	Term	Restricted admission
GEOG3505*	Landscape og planning	15	Autumn	No
GEOG3506*	Geography, Health and Development	7,5	Autumn	No
GEOG3510*	Geographical Information Systems (GIS) – principles and application	15	Autumn	Yes
GEOG3511*	Remote Sensing	15	Autumn	Yes
GEOG3515*	Environment, development and changing rural livlihoods	7,5	Autumn	No
GEOG3516*	Humanitarianism: theory and pratice	7,5	Autumn	No
GEOG3561*	Gender and Social Change	7,5	Autumn	No
AAR4945*	Planning and Construction in Developing Countries	7,5	Spring	No
BARN3300	Childhood and Development in the South	7,5	Spring	No

Table of MPhil in Development Studies:

Semester	Title (15 cr)		Title (15 cr)
4. Term/Spring	GEOG3920		
3. Term/Autumn	GEOG3920		Electives (15 credits)
2. Term/Spring	GEOG3050	EIT	GEOG3052
1. Term/Autumn	GEOG3050	Electives (22,5 credits)	

Candidates are expected to use the summer between the second and third term to collect data and conduct fieldwork for their thesis. The thesis is expected to be completed within four terms from admission to the course. Supervision will not be given beyond this. The thesis must be written in English.

Course descriptions

Faculty of Architecture and Fine Art

AAR4945 Planning and Construction in Developing Countries
Lecturer: Professor Hans Christie Bjønness
Teaching: Teaching: Spring: 7.50 Cr
Grade: Grade: A - F
Compulsory assignments: None
Required previous knowledge: The course gives priority to course AAR4525 Urban Ecological Planning in Developing Countries. Project Work, and course AAR4820 Urban Ecological Planning. Theory, and AAR4816 Urban Ecological Planning, Method.
Learning objectives: - The course is to give an introduction to basic preconditions and applicable knowledge for carrying out planning, infrastructure and construction activity on a sustainable basis in developing countries.
- Methods for project-planning of developing measures are to be mastered and practised.
Academic content: - Alternative theories of development, "eco-development" and principles for territorial social development and planning.
- Settlement and housing problems, and politics in developing countries.
- The role of infrastructure in development and urban planning.
- Construction and use of alternative materials in developing countries.
- Cultural continuity and diversity in development.
- Planning during crises and post-catastrophe planning.
- The roles of CBOs, NGOs and INGOs in development.
- Participant-, problem-, and goal-based project-planning methods (LFA) are to be mastered and applied in group work. The project proposals are to written according to UN/NORAD template.
- Project evaluation.
Teaching methods and activities: The course is given in cooperation with several departments at the Faculty of Architecture and Fine Art, the Faculty of Engineering Science and Technology, and the Faculty of Social Science and Technology Management. Weight is placed on interdisciplinary seminars with introductory speakers from other faculties and specialists with experience in development-related issues. Case studies are presented and discussed. One exercise is to be carried out as

group work.
The course is held together with AAR4230.
Compendium with course literature.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

Department of Geography

GEOG3050 Theories of Social Change
Teaching: 1st sem. spring, 2nd sem. autumn: 15.0 Cr
Language of instruction: English
Credit reduction: SVGEO350: 15.0 Cr, GEOG3504: 7.50 Cr
Grade: Grade: A - F
Compulsory assignments: Assignment, seminar presentation and term paper
Required previous knowledge: Bachelor in geography. Other relevant qualifications can be accepted upon approval by the Department of Geography
Learning objectives: Students shall broaden their knowledge of theories of social change through an introduction to different analytical perspectives in development theory and practise.
Academic content: GEOG 3050, Theories of Social Change and Development, is compulsory for students at the MPhil in Development Studies. The course serves as an introduction to the main theme of the MPhil programme. Students shall broaden their knowledge of theories of social change and development. Different theories will be introduced and examined with respect to key concepts, perspectives and key development challenges of our times such as poverty alleviation and growth, globalisation and marginalisation, gender and development, civil society mobilisation and other post-development discourses. The course draws on a wide range of practical and empirical knowledge, as the lecturers represent several disciplines within the social sciences and many have cross-cultural experience.
During the autumn term the course consists of lectures and one compulsory assignment, while the spring term consists of seminars/group work and term paper writing. The term paper should serve as an epistemology paper for the thesis and should be presented at a final seminar (compulsory).
Teaching methods and activities: Lectures, seminars and term paper. Exam: written exam 6 hours (50%) and term paper (50%)
Assessment: Written examination/Written assignment

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	6.0 HOURS	1/2	
ASSIGNMENT		1/2	

GEOG3052 Research Methodology
Teaching: Spring: 15.0 Cr
Language of instruction: English
Credit reduction: SVGEO355: 15.0 Cr
Grade: A - F
Compulsory assignments: Field trip 7-10 days (incl. preparations, compulsory)
Learning objectives: The aim of the course is twofold. One main goal is to prepare the student for using methodology in his/her master thesis. The other main goal is to give the students skills and experiences in a fieldwork situation through a common field course.
Academic content: The course is comprised of four parts: (1) a common part, (2) an elective part in which students choose a qualitative or quantitative module, (3) a field course, and (4) an assignment. In the common part, emphasis is placed on developing a critical and reflexive attitude to the choice and usage of different research designs. The common part gives an overview of the possibilities and limitations of different types of data and methods for collecting and analysing data.
In the common part, all students must take part in group work based on designing and using a questionnaire, and will present their work in a seminar.
Students then choose either the qualitative or the quantitative module. Lectures, seminars and practicals will to a large extent be shared with Master of Geography students.
In the qualitative module, students will be trained in using qualitative methods such as different types of interview, observation and text analysis. The tuition comprises lectures, seminars and assignments. The assignments will provide practical training in different techniques for collecting qualitative data and analysis, reflection on ethical approaches to problems, and the communication of such data.
The quantitative module gives a closer presentation of quantitative research schemes, with a particular focus on statistical analysis of available data. Also included is the use of a statistical software package (SPSS) for analysis of data. Research design based on covariance and regression will be presented, as will other analytical techniques based on the students' particular needs. Students must carry out exercises in quantitative techniques which are relevant for their master thesis.

The methodology in both modules is further connected to a field course, in which students work in groups on particular topics. The purpose of the field course is to put into practice the use of methodology, and the group work will form part of a common field course report.
In the concluding part of the course, students will prepare an assignment in which they reflect on use of methodology (based on qualitative and/or qualitative methods), central geographical concepts and development theory in their own master's thesis.
Teaching methods and activities: Lectures: 14 hours
Learning objectives: Seminars:12 hours
Field course:7-10 days (incl. preparations)
Requirement: Approved field course with report and assignments/exercises
Exam: Assignment and oral exam
Assessment: Written assignment/Oral examination

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT			
ORAL EXAMINATION			

GEOG3505 Landscape and Planning
Teaching: Autumn: 15.0 Cr
Language of instruction: English
Credit reduction: SVGEO323: 7.50 Cr, SVGEO326: 7.50 Cr, SVGEO362: 7.50 Cr
Grade: A - F
Compulsory assignments: Approved term paper/project work.
Recommended previous knowledge: See formal requirements.
Required previous knowledge: Bachelor in geography. Other relevant qualifications can be accepted upon approval by the Department of Geography
Learning objectives: The course aims to give insight into theoretical and methodological problems in connection with landscape seen in relation to planning.
Academic content: The course studies the concept of landscape, landscape values, and theoretical and methodological problems in landscape planning and management. It is offered to students on the Department's two Master degree programs. Students taking the MPhil in Development Studies write an individual semester essay based on the course literature. Students taking the Master in Geography participate in a project where, through fieldwork, interviews and document analysis, they analyse a concrete planning situation in which landscape and environmental values are involved. The project is normally undertaken as group work. The aim of the project is to give insight into how and to what extent consideration of the landscape and environment is included in planning and management and to illustrate what problems relating to landscape and environment are encountered in the general planning process. The lectures will normally be given in English. For students taking the Norwegian master's course, the project is conducted in Norwegian, and the group report will normally be written in Norwegian.
Teaching methods and activities: 30 hours lectures.
Compulsory activity: Approved term paper/project work.
Form of assessment: Oral exam.
Assessment: Oral examination

Forms of assessment	Time	Percentage	Deadline
ORAL EXAMINATION		1/1	

GEOG3506 Geography, Health and Development
Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: SVGEO331: 7.50 Cr
Grade: A - F
Compulsory assignments: Approved term paper and presentation
Recommended previous knowledge: See formal requirements.
Required previous knowledge: GEOG1000-1006 or the equivalent.
Learning objectives: The course aims to give a broad overview of geographical perspectives on health with two main focuses:
1) Health status, disease/injury and risk/risk factors.
2) Geography of health services at different levels, with emphasis on demand and use, availability and accessibility, prevention, and treatment.
Academic content: The main emphasis of the course is on the situation in developing countries, but more general development trends in health and health services in different parts of the world are also covered. As well as a common core curriculum, two in-depth courses (curriculum variations) are offered: one that studies developing countries' perspectives in more detail, and a guideline for studying westernized countries (among which Norway is central). The course covers studies in quantitative and qualitative method traditions.
Part of the study is based on student's own reading which forms the foundation for carrying out the semester essay. This is presented at a seminar. A seminar is also arranged on searching for medical and health literature in libraries and databases (3 hours). The semester essay and presentation must be approved before the written examination can be taken.

Teaching methods and activities: 20 hours lectures, 8 hours seminars.
Compulsory activity: Approved term paper and presentation.
Form of assessment: 4 hour written exam.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

GEOG3510 Geographical Information Systems
Teaching: Autumn: 15.0 Cr
Language of instruction: English
Credit reduction: SVGEO328: 15.0 Cr
Grade: A - F
Compulsory assignments: Approved assignments and project work.
Recommended previous knowledge: Mathematics (linear algebra), statistics or data processing (programming, database, graphic data processing) equivalent to c.7.5 credits.
Required previous knowledge: Minimum 82,5 credits.
Learning objectives: The course aims to provide advanced knowledge of geographical information systems (GIS), including a comprehensive overview of the use of GIS functions. Students will become acquainted with how GIS can be used within both social scientific research (the use of GIS in conflict and peace research) and physical sciences research (the use of GIS in research on risks and consequences of landslides, flooding and other geohazards).
Academic content: Academic content: Different types of data collection, processing and presentation of geographic data with the help of GIS will be covered. The central components of the course include GIS-based modelling (geoprocessing) and ethical considerations.
During the semester students will carry out several in-depth exercises as well as a larger project assignment. These must be approved before the examination can be taken and will count towards the determination of the final grade awarded for this course.
Teaching methods and activities: 22 hours lectures, 48 hours practical and project.
Compulsory activity: Approved assignments and project work.
Form of assessment: Written exam, results from exercises.
Assessment: Written examination/written work

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	6.0 HOURS	1/2	
APPROVED EXERCISES		1/2	

GEOG3511 Remote Sensing
Teaching: Autumn: 15.0 Cr
Language of instruction: English
Credit reduction: SVGEO329: 15.0 Cr
Grade: A – F
Compulsory assignments: Approved assignments and project work
Recommended previous knowledge: Mathematics (linear algebra), statistics or data processing (programming, database, graphic data processing) equivalent to c.7.5 credits.
Required previous knowledge: Bachelor in geography. Other relevant qualifications can be accepted upon approval by the Department of Geography
Learning objectives: The aim of the course is to give an introduction in the use of satellite images in approaches to geographical problems.
Academic content: The course provides a comprehensive overview of how data collection from satellites is made. Students are introduced to different sources (different satellites), methods for processing and correcting digital images, and different application possibilities for digital satellite images, aerial photographs and orthophotos. An important element is explanation of how the digital images can be integrated in a geographical information system (GIS). Students are given an introduction to specialist program packages such as Idrisi.
During the semester students undertake a number of short exercises together with a larger project. These must be approved before the examination can be taken. The oral examination is based upon the project work and the course curriculum.
Teaching methods and activities: 24 hours lectures, 24 hours practical and project.
Compulsory activity: Approved assignments and project work.
Form of assessment: Oral exam.
Assessment: Oral examination

Forms of assessment	Time	Percentage	Deadline
ORAL EXAMINATION		1/1	

GEOG3515 Environment, Development and Changing Rural Livelihoods

Teaching: Autumn: 7.50 Cr

Language of instruction: English

Grade: A - F

Compulsory assignments: Groupwork and presentation

Required previous knowledge: Bachelor in geography. Other relevant qualifications can be accepted upon approval by the Department of Geography.

Learning objectives: The course will explore different conceptualisations and (mis-) understandings of the links between development, environment and environmental change and (rural) livelihood in African and Asian societies. Among the topics covered by the course: *History of geographical thought: From environmental determinism to political ecology. *Social nature; Social constructivism and environmental narratives. *Institutions, norms and collective action and the idea of the community' as basis for natural resource management. *Hazards and vulnerability. Vulnerability; a useful concept or just another way of labelling?: Vulnerability analysis in practice *Environmental conservation and development; from Fortress conservation' to Conservation and development' *Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. * Environment and conflicts. The 'Environment' as basis for conflicts.

Academic content: The course will explore different conceptualisations and (mis-) understandings of the links between development, environment and environmental change and (rural) livelihood in African and Asian societies. Among the topics covered by the course: *History of geographical thought: From environmental determinism to political ecology. *Social nature; Social constructivism and environmental narratives. *Institutions, norms and collective action and the idea of the community' as basis for natural resource management. *Hazards and vulnerability. Vulnerability; a useful concept or just another way of labelling?: Vulnerability analysis in practice*Environmental conservation and development; from Fortress conservation' to Conservation and development' *Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. * Environment and conflicts. The Environment' as basis for conflicts.

Learning objectives: 18 hours. Groupwork and presentations (obligatory)

Assessment: Written

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

GEOG3516 Humanitarianism: Theory and Practice

Teaching: Autumn: 7.50 Cr

Language of instruction: English

Grade: A – F

Compulsory assignments: Assignment and introductory seminar

Recommended previous knowledge: The course is given at MA-level, a background equivalent to Bachelor in social sciences or extensive field experiences is recommended.

Learning objectives: This course will examine the principles underpinning humanitarian aid and investigate how they are being realized in the field. Embedded in humanitarian action are a number of contentious issues regarding the relationships between political aims of donors and host governments and the people concerned. The course will stress the relationship between theory and practice and how to deal with operational dilemmas on the ground.

Academic content: The lectures will introduce principles and theories of humanitarian action; the various actors involved and the relationship between them; the emergence of humanitarian regimes; the relationship between political development and humanitarian practice; humanitarianism and forced migration; gender, ethnicity and humanitarian challenges; ethical dilemmas, aid conditionality and the Do No Harm and Relief to Development concepts. The lectures are internet based with one day compulsory introductory seminar. For the students present at NTNU some seminars relating to the internetbased lectures will be held. Assignments are approved/not approved.

Teaching methods and activities: Internet based, equivalent to 16 hours, 1-day compulsory introductory seminar, seminars for the students present at NTNU.

Compulsory activity: Assignments and introductory seminar

Form of assessment: Home exam (5 days).

Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

GEOG3561 Gender and Social Change

Teaching: Autumn: 7.50 Cr

Language of instruction: English

Credit reduction: SVGEO361: 7.50 Cr

Grade: A - F

Compulsory assignments: None

Required previous knowledge: For Norwegian students: Bachelorgrad or "mellomfag" in Geography. Other relevant qualifications can be accepted if approved by the Department.

Learning objectives: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues.

Academic content: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues. The course seeks to combine an interdisciplinary and subject-specific approach. It aims at outlining different perceptions of gender within different social scientific traditions. Theoretical and methodological problems related to the use of gender as an analytical category and how these are manifested in social scientific research are examined. The course also includes presentations of empirical material from gender-specific research within the field of geography and other social sciences.
Teaching methods and activities: 18 hours lectures and seminars with active involvement from students.
Assessment: Written

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

GEOG3920 Master Thesis in Development Studies, specialising in Geography
Teaching: 1st sem. springr, 2nd sem. autumn: 45.0 Cr
Language of instruction: English
Grade: A - F
Compulsory assignments: None
Required previous knowledge: This course is only for students who are taking the Master in Development Studies.
Learning objectives: The aim of the course is to give the students training in doing a substantial individual research project.
Academic content: The student must prepare a project proposal of at least 5 pages before November 1. in the first term. On the basis of the project proposal, a faculty member will be appointed as supervisor in accordance with the guidelines approved by the Board of the Department. The supervisor must be kept informed about the progress of the writing.
The thesis consists of a scientific presentation of a chosen topic. The thesis should be 90 - 100 pages (Times Roman 12/ spacing 1.5/ approximately 40000 words).
Teaching methods and activities: Seminars with emphasis on theoretical and practical issues related to the writing of a master's thesis will be held during the first and the second year. Students are expected to present their thesis work for fellow students and faculty members at 2-3 seminars. It is expected that students will need a full academic year to complete the thesis. It is recommended that students start to work on their thesis in their second term.
Exam: Thesis and oral. The oral exam is used to adjust the grade given for the thesis.
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS			

Credit adjustment due to overlap in content:

SVGEO350	GEOG3050	15 credits
SVGEO351	GEOG3051	15 credits
SVGEO355	GEOG3052	15 credits
SVGEO361	GEOG3561	7,5 credits

MASTER OF PHILOSOPHY IN HUMAN DEVELOPMENT

Approved by the Board at NTNU 9. November 2004, with changes made by the Faculty of Social Sciences and Technology Management 13.02.2006

Aim
The aim of this programme is to provide a broad, interdisciplinary knowledge-base for disciplines concerned with human change throughout the life span. To fulfil this aim, the Department of Psychology offers this programme in collaboration with other departments at NTNU. It interfaces related themes from psychology and a wide range of other disciplines. Its distinguishing feature is the inclusion of different theoretical approaches and a variety of methodological stances. English, both orally and written, will be the language of instruction.
The over-arching concerns throughout the course include but are not limited to:

The process of change within the individual.
Human change is multi-modal, always comprising the multi-facted dimensions of human existence. Nowadays, the position is widely accepted that a general developmental perspective for understanding human change must include the full spectrum of perspectives within Psychology –for example, perception-action coupling, motor skills, personality, and social psychology. Likewise, it must dialogue with research findings of allied disciplines, such as Geography, Anthropology, Sociology, Human Movement Science, Architecture, Health Science and Medicine.

The process of human change across all phases of the life course.
Developmental psychology has traditionally been largely synonymous with child psychology. However, reaching chronological adulthood does not halt development and human change. Today it is widely accepted that an individual develops through his or her entire life.

The process of societal change, and how it affects – and is affected by – individuals
Change is not a one-way process, where a few factors cause a few outcomes. The processes of change follow the rules of multi-causality and multi-finality that means many agents interact in a dynamic way. Therefore, the impact of shifting individual coping styles upon society cannot be separated or isolated form the way upheavals in society impact individual adjustment. So it is necessary to study the effect human change has on society as well as the ways individuals cope with societal change.
The central theme of this programme is change within the individual (ontogenesis) and between individuals, but also microgenetic change, that is, change in the real time deployment of behaviour in particular areas of human activity, for example, skills, habits, or communicative interaction.
Ontogenesis:
Human beings have to cope with change throughout their lifespan. Some of these changes are biological-maturational, such as growing up and learning to move, puberty, menarche and constant body changes related to age. These changes occur for all healthy human beings within certain periods of their life. Other changes are of a normative social character, heavily influenced by the culture and historical time the individual lives in. These are changes like beginning school, marrying, becoming a parent, retirement, and so on. Finally, there are non-normative changes, challenges some individuals will meet and others not, at unpredictable points in their lifespan. These include minor challenges such as dealing with everyday experiences, new tasks in social life, work and leisure time, and significant life events, such as coping with divorce, illness or unemployment. Facing changes and dealing with them successfully is the motor of human development: the cessation of change is the beginning of stagnation. The aim of the programme is to understand and study human reactions in the face of change across the lifespan, and to find applications of this knowledge in dealing with human beings in different settings.
Microgenesis:
Change also involves development of skills, such as motor skills, social skills and skills involved in man-machine interaction. Actions develop into routines and habits emerge, both in the individual and in the interaction between individuals.
Emphasis will be put on the process of change, in contrast to traditional approaches in developmental psychology, where the outcome of change processes is the main issue. In this process the relationship between changes in the individual and changes in the environment is looked upon as a complex whole; for example, the individual's own actions may lead to changes in the environment, which, in turn, may influence the individual. In this respect the relationship between ontogenetic change and microgenetic change is a central issue.
Integration:
This programme has the ambition to give students a broad and integrated understanding of the change processes underlying human development. It is therefore important that the students get acquainted with as well intraindividual (such as biological and cognitive) change processes as interindividual (relational, social, and cultural) change processes. Also, acquaintance with different methodological approaches pertaining to different aspects of human change processes will be emphasized. However, students may come to this programme with varying background and interests. They will be encouraged to develop their own meaningful and comprehensive

plans for the study. Coordination and cooperation among the teachers as well as between teachers and the students involved will help the student to maintain integration also in their individual projects.

Employment opportunities
Administration
Applied science
Research
Studies and evaluations for the public sector

Admisson
General information:
Sixteen students will be admitted each fall semester, whereof half International, and half Norwegian. Candidates will be selected on the basis of administrative requirements complemented by a judicious assessment.

Requirements
Bachelor of social science in Psychology or equivalent. Approximately 1.5 years of university studies within Psychology, and courses within Statistics, Research Methods, and Theory of Science must be covered within the first degree.
English Language Requirements: Norwegian applicants must have passed the required exam in English language ("Engelsk grunnkurs") from the Norwegian Higher Secondary School. Applicants from European or other industrialised countries, having ratified the Lisbon Convention, should document a minimum of 7 years of English as a subject from their primary and secondary school when submitting the final application form. Applicants from such countries, who have less than 7 years of English from primary and secondary school, as well as applicants from other countries must pass either the TOEFL with a minimum paper score of 550 (213 on computer based test) or IELTS with 6.0 or better. Citizens from Ireland, the UK, US, Canada, Australia and New Zealand do not have to submit TOEFL/IELTS test results. This is also the case for applicants who have spent at least one year in either of these countries, attending higher secondary school or university. Exempted are also applicants from African countries with a bachelor degree where the language of instruction has been English and those who have passed English as a subject at GCE A-level with grade C or better. Please be aware that applicants from Asian countries with a BA degree where the language of instruction has been English are not exempted from the English language requirements.
Officially certified copies of all educational certificates, including transcripts and diplomas from all secondary school(s) and university/universities.
The faculty can make certain exceptions from some requirements.

Code	Title	Cr	Semester	Restricted admission
PSY3080	Biological and Cognitive Aspects of Development	15	Autumn	Yes
PSY3081	Research Methodology, Theories of Sciences and Ethics	15	Spring	Yes
PSY3082	Relational and Cultural Aspects of Development	15	Autumn	Yes
PSY3083	Specialization in Biological and Cognitive Aspects of Development	7,5	Spring	Yes
PSY3084	Individually Selected Texts	15	Autumn	Yes
PSY3904	Master's Thesis	45	Autumn and Spring	Yes
SANT3506	Specialization in Relational and Cultural Aspects of Development	7,5	Spring	Yes

Outline Of The Programme

Semester 4 **Spring**	PSY3904 Master's Thesis (30 cr)		
Semester 3 **Autumn**	PSY3904 Master's Thesis (15 cr)	PSY3084 Induvidually Selected Text (15 cr)	
Semester 2 **Spring**	PSY3081 Research Methodology, Theories of Sciences and Ethics (15 cr)	SANT3506 Specialization in Relational and Cultural Aspects of Development (7,5 cr)	PSY3083 Specialization in Biological and Cognitive Aspects of Development (7,5 cr)
Semester 1 **Autumn**	PSY3080 Biological and Cognitive Aspects of Development (15 cr)	PSY3082 Relational and Cultural Aspects of Development (15 cr)	

Course descriptions

Department of Psychology

PSY3080 Biological and Cognitive Aspects of Development

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Pass/Fail
Compulsory assignments: None
Required previous knowledge: Bachelor degree in Psychology or equivalent.
Learning objectives: The course will provide the basis conceptual tools for the understanding of biological and cognitive aspects of change processes underlying human development.
Academic content: In the enlarged sense already described above this basic course on human development comprises four blocks, which introduce selected theoretical and empirical themes pivotal to a comprehensive understanding of human change processes. Specifically, they will provide a basis for the understanding of biological and cognitive processes underlying development of action and experience. The detailed content of each block might vary from one semester to another.
Course materials: Syllabus: 800 p
Teaching methods and activities: Teaching semester:Autumn
Semester cycle:Flexible cycle, graduate level
Block teaching: lectures and seminars
Examination:Four papers (Pass/Fail)
DeadlinesSubmission of papers 2 weeks after end of block teaching.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

PSY3081 Research Methodology, Theories of Sciences and Ethics

Teaching: Spring: 15.0 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: None
Required previous knowledge: Requirements: Bachelor degree in Psychology or equivalent.
Learning objectives: The course will (1) provide a foundation in theories of sciences for the choice of research methods, (2) provide insight in the ethical implications of different methodological approaches to research, (3) provide a foundation for autonomously developing and carrying out a structured interview and a questionnaire, an experimental design, a qualitative research design, and provide knowledge of width in scientific designs as a basis for adequate choice of methods and practical implementation of research projects.
Academic content: The course is an introduction to scientific research methods and their foundation in theories of sciences and ethics. Quantitative and qualitative methods are treated as equally important. The course expands and pursues selected knowledge concerning methodology that students bring with them from their Bachelor?s Degree training. The basic rationale of quantitative approaches are discussed in relation to selected designs most pertinent to assessing human change processes. There is a particular emphasis on interpretation and presentation of results of the selected designs and analyses through practical exercises with SPSS.
The course also offers the basic rationale for qualitative approaches in general, and provides a thorough study of selected qualitative methods. Different techniques for collecting, structuring, and analyzing qualitative data are studied. The students will be trained in carrying out qualitative research.

The course will not cover all different quantitative and qualitative approaches. The selected approaches will be related to the specializations in human development offered by PSY3083 and SANT3506. However, the training in the selected approaches should give the student a basis for studying independently other methodological approaches they will deem relevant and useful in the future.
Course materials: Syllabus: 800 p
Teaching methods and activities: Teaching semester: Spring
Semester cycle:Flexible cycle, graduate level
Lectures, seminars, field work, and exercises
Syllabus: 800 p
Examination: 6 hour written exam on Quantitative Methods. One exam paper on Quantitative and Qualitative Methods, Theories of Sciences and Ethics. Letter grade on each part. Written exam and exam paper are weighted 1/2, 1/2 in the final grade.
Deadlines: Submission of paper 2 weeks after end of teaching.
Assessment: Written assignment/Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION		1/2	
ASSIGNMENT		1/2	

PSY3082 Relational and Cultural Aspects of Development

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Pass/Fail
Compulsory assignments: None
Recommended previous knowledge: See requirements
Required previous knowledge: Bachelor degree in Psychology or equivalent. Students admitted to MPhil in Childhood Studies are exempted from this requirement.
Learning objectives: The course will provide the basis conceptual tools for the understanding of interpersonal, social, and cultural aspects of change processes underlying human development.
Academic content: In the enlarged sense already described above this basic course on human development comprises four blocks, which introduce selected theoretical and empirical themes pivotal to a comprehensive understanding of human change processes. Specifically, they will provide a basis for the understanding of interpersonal, social and cultural processes underlying the development of individuals and groups. The detailed content of each block might vary from one semester to another.
Course materials: Syllabus: 800 p
Teaching methods and activities: Teaching semester: Autumn
Semester cycle:Flexible cycle, graduate level
Block teaching: lectures and seminars
Examination: Four papers (Pass/Fail)
Deadlines: Submission of papers 2 weeks after end of block teaching.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

PSY3083 Specialization in Biological and Cognitive Aspects of Development

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: A-F
Required previous knowledge: Bachelor degree in Psychology or equivalent.
Learning objectives: The course should (1) provide an opportunity for both theoretical and practical knowledge in cognitive and/or biological aspects of human change processes by participation in ongoing research, (2) provide experience in carrying out projects in the selected areas, (3) provide exercise in oral presentation of research
Academic content: The purpose of the course is to develop and integrate theoretical, practical and methodological knowledge in cognitive and/or biological aspects of development. A number of projects will be offered, of which the student should choose two, ensuring that two different methodological approaches will be covered. To maintain a fairly equal distribution of students among the projects, it might not be possible to guarantee that all students will have their first choices. In accord with a teacher students may also propose a project of their own.
Course materials: Syllabus: 400 pp
Teaching methods and activities: Teaching semester: Spring
Semester cycle:Flexible cycle, graduate level
Tutorials, exercises, project work and oral presentation
Compulsory activities: Oral presentation
Examination: Two paper presentations, written and oral Letter grades on each paper. The papers are weighted 1/2, 1/2 in the final grade (A through F).
Deadlines: Schedules for oral presentation is set up before January 31. Submission of written paper on March 15.

Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/2	
ASSIGNMENT		1/2	

PSY3084 Individually Selected Text

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: None
Required previous knowledge: Requirements: Bachelor degree in Psychology or equivalent.
Learning objectives: Extensive knowledge of an area of particular interest to the student.
Academic content: The student chooses the subject, and a syllabus of approximately 800 pages, for the paper. This is to be approved by the subject teacher and an appointed supervisor. The curriculum cannot include literature used as syllabus in other courses in the program. The student is free to choose an area related to, or not related to the area of the Masters Thesis.
Course materials: Syllabus: Individually selected, 800 p.
Teaching methods and activities: Teaching semester: Autumn
Semester cycle:Flexible cycle, graduate level.
Teaching methods and activities: Self study.
Examination: Individual paper, approximately 15 to 20 pages, submitted at the end of the semester. Letter grade.
Deadlines: In agreement with examiner and administration.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

PSY3904 Masters Thesis in Human Development

Teaching: 1st sem. springr, 2nd sem. autumn: 45.0 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: None
Required previous knowledge: Requirements: Bachelor degree in Psychology or equivalent.
Learning objectives: After having completed the Master?s Thesis the student should have acquired ability to (1) carry out a scientific research project, (2) think in a principled and logical way, (3) work independently, (4) carry out a large project within a predefined time frame.
Academic content: The Masters Thesis consists of a theoretical or empirical investigation on a subject chosen within the above described enlarged definition of Human Development, preferably related to one or several of the specializations studied in PSY3083 and SANT3506. The student should contact teachers at the Masters program for advice on choice of subject. Supervision is an important part of the work with the Masters Thesis. It will ensure that the student is acquiring relevant knowledge and guarantee high standards in collection and analysis of data. It will also ensure that it follows the guidelines for research ethics. Supervision is therefore a compulsory for every student that wishes to submit a Masters Thesis. The subject for the Masters Thesis will have to be approved by the Department of Psychology, which also appoints a supervisor. The Department will announce deadlines for applications for approval of subject and appointment of supervisor. The main office of the Department provides application form.
There are specific rules for how a Masters Thesis should be written, as well as criteria for grading a thesis. The Department provides these on request.
Examination in PSY3904 is passed in the last semester of the programme and the student register for the exam on a specific form provided by the Department, in addition to regular exam registration. The Masters Thesis is submitted in six copies.
Teaching methods and activities: Teaching semesters: Autumn and spring
Teaching methods and activities: Self study
Examination: Masters Thesis and oral exam. Letter grade.
Deadlines: In agreement with examiner and administration
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS		1/1	

SANT3506 Specialization in Relational and Cultural Aspects of Development

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: None
Required previous knowledge: Requirements: Bachelor degree in Psychology or equivalent.
Admission restrictions: Yes
Learning objectives: The course should
- provide an opportunity for both theoretical and practical knowledge in interpersonal, social, and cultural aspects
Learning objectives: of human change processes by participation in ongoing research
- provide experience in carrying out projects in the selected areas
- provide exercise in oral presentation of research results

Academic content: The purpose of the course is to develop and integrate theoretical, practical and methodological knowledge in interpersonal, social, and cultural aspects of development. A number of projects will be offered, of which the student should choose two, ensuring that two different methodological approaches will be covered. To maintain a fairly equal distribution of students among the projects, it might not be possible to guarantee that all students will have their first choices. In accord with a teacher, students may also propose a project of their own.
Course materials: Syllabus: 400 pp
Teaching methods and activities: Teaching semester: Spring
Semester cycle:Flexible cycle, graduate level
Teaching methods and activities: Block teaching: lectures and seminars
Examination: Two paper presentations, written and oral. Letter grades on each paper. The papers are weighted 1/2 - 1/2 in final grade
Deadlines: Submission of papers 2 weeks after end of block teaching.
Assessment: Written assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/2	
ASSIGNMENT		1/2	

MASTER OF PHILOSOPHY IN CHILDHOOD STUDIES

Approved by the Board at NTNU 30.08.2005, with changes made by the Faculty of Social Sciences and Technology Management 15.02.2006

The Norwegian Centre for Child Research (NOSEB) offers an interdisciplinary, international master's programme in Childhood Studies, which starts in the autumn semester 2006. The degree is awarded by the Faculty of Social Sciences and Technology Management at NTNU and administered by NOSEB. The master's programme offers an advanced education within the interdisciplinary social studies of children and childhood. The aim of the programme is to generate knowledge about childhood, children's life-worlds, and the politics of childhood in changing societies. The programme will give a broad introduction to different theoretical and methodological perspectives and key concepts in contemporary social research on children and childhood. The central issue is childhood and related themes such as generation, gender, identity and ethnicity as these take form through varying processes like globalisation, institutionalisation, consumption and commercialisation.
The master's programme is theoretically and methodologically related to the new social studies of childhood. A child perspective represents a main integrative approach. Children's rights to protection, provision and participation, as stated in the UN Convention on the Rights of the Child (CRC), represent an important point of departure for discussing children as participants in play, child labour, community building and social, political and economic reproduction of society at large. CRC can be seen as part of globalisation processes, producing particular images of what it means to be a child. An important task is to create comprehensive insights in and understanding of how the globalised conditions under which children grow up affect 'local' and 'national' childhoods in the western world as well as in countries in the South. The ways in which children themselves explore and experience their everyday lives and childhoods will be explored.

Employment opportunities
The master's programme will be relevant for building career related to children and childhood in different public sectors in governmental organisations. This may include policy and planning for children's living conditions in ministries and institutions which concern children, both locally and internationally. Another important area is Non-Governmental Organisations (NGOs), such as Save the Children and the Red Cross. In addition, the master's programme qualifies for work related to research, consultancy, teaching and supervision in the field of children, welfare and development.

Admission Requirements
The programme is open to both international and Norwegian students. There are 8 places for students from countries in the South, 4 places for students from Norway and 3 places for students from other western countries.
Admittance to the programme requires a bachelor's degree in a social science or humanities discipline, or other equivalent education.
The language of instruction is English, and the applicants must document their English proficiency by achieving one of the following:
- A pass of the foundation course ("grunnkurs") in English at a Norwegian Upper Secondary School
- TOEFL-test with a minimum of 550 points (213 computer-based test)
- IELTS-test with 6.0 points or better

Course Outline
The master's programme in Childhood Studies involves two years of full-time studies. The programme is structured around core courses (45 credits) and elective courses (15 credits), which both provide a general introduction to theory and methodology and give the students the opportunity to qualify within particular topics. In addition, the programme consists of a master's thesis (60 credits). The normal workload for a full-time student for one academic year is 60 credits.

Core courses

Code	Title	Cr	Term	Restricted admission
BARN3100	Childhood and Culture: Research Perspectives	15	Autumn	No
BARN3200	Methodology in Child and Childhood Research	15	Spring	No
BARN3300	Children and Development in the South	7.5	Spring	No
BARN3400	Preparatory course, master's thesis	7.5	Spring	Yes
BARN3900	Master's thesis	60	Autumn/ spring	Yes

Elective courses MPhil in Childhood Studies

Code	Title	Cr	Term
AFR3000	Africa and Development	7.5	Autumn
GEOG3506	Geography, Health and Development	7.5	Autumn
GEOG3515	Environment, Development and Changing Rural Livelihoods	7.5	Autumn
GEOG3516	Humanitarianism: Theory and Practice	7.5	Autumn
GEOG3561	Gender and Social Change	7.5	Autumn
PSY3082*	Relational and Cultural Aspects of Development	15	Autumn
SANT3502	Anthropological Perspectives on Sex and Gender	7.5	Autumn
*This course may practice restricted admission. More information about this will be given at the start of the semester.			
Electives			
Code	**Title**	**Cr**	**Term**
BARN3101*	Social Studies of Children and Childhood: Research Perspectives	7.5	Autumn
BARN3102*	Children's Rights	7.5	Autumn

*Part one and two of BARN3100. These courses are offered as electives to students accepted at other master's programmes than MPhil in Childhood Studies.

Outline Of Mphil In Childhood Studies Programme

Semester	Course	Course	Course	Course
4. sem/spring	Master's thesis (60 credits)			
3. sem/autumn				
2. sem/spring	BARN3200 Methodology in Child and Childhood Research (15 credits)		BARN3300 Children and Development in the South (7.5 credits)	BARN3400 Preparatory course, master's thesis (7.5 credits)
1. sem/autumn	BARN3100 Childhood and Culture: Research Perspectives (15 credits)		Elective (7.5 credits)	Elective (7.5 credits)

At the beginning of 1st semester a common ground between students and teachers will be established. Through social and scientific arrangements everyone will get the opportunity to get to know each other. Both students and teachers are encouraged to share experiences from their own childhoods and/or childhoods in their 'home country', and basic theoretical perspectives within Childhood Studies will be introduced and discussed.

Course descriptions

Core courses

Norwegian Centre for Child Research

BARN3100 Childhood and Culture: Research Perspectives

Teaching: Autumn, 15.0 Cr
Language of instruction: English
Credit reduction: BARN3001: 7.5 cr. BARN3101: 7.5 cr. BARN3102: 7.5 cr.
Grade: A-F
Compulsory assignments: Approved working paper and oral presentation
Recommended previous knowledge: See required previous knowledge.
Required previous knowledge: Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.
Learning objectives: * To generate knowledge about childhood as a social phenomenon, children's life-worlds, welfare and the politics of childhood in changing societies.
* To provide an historical overview of essential research perspectives in social studies of children and childhood.
* To introduce key debates concerning the research of children's everyday life and culture, and contemporary perspectives on childhood.

* To discuss how cultural representations of childhood are dynamic and change with both time and space.
* To generate knowledge of contemporary global discourses on children's rights.
Academic content: Academic content: The course addresses changing paradigms in child research, including childhood as development and childhood as socially constructed. Issues both of a structural nature, which has an implication for children's everyday lives and childhood, as well as children's agency in defining and giving meaning to their lives and activities, will be discussed. Discourse theoretical perspectives, challenging the split between agency and structure, will be included. The central issues are childhood and related themes such as generation, gender, life-course, ethnographies of childhood, identity and ethnicity as these take form through varying processes like globalisation, institutionalisation, consumption and commercialisation. The UN Convention on the Rights of the Child and its implications for children's lives in different parts of the world will be discussed. Other topics are children as social participants in economic, social and cultural reproduction of society and childhood as a symbolic space.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total lecture hours: 36 hours, total seminar hours: up to 16 hours. The course consists of: (1) A common introduction with lectures. The lectures are organised in two parts. Part one is equivalent to BARN3101 and part two is equivalent to BARN3102. (2) A seminar with presentation and discussion of the students' working papers. The students can choose between writing their working paper individually, or together with 1-2 of their fellow students. Each student will be required to comment on another student's working paper.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	6.0 HOURS	1/1	

BARN3200 Methodology in Child and Childhood Research

Teaching: Spring: 15.0 Cr
Language of instruction: English
Credit reduction: BARN3002: 7.5 cr.
Grade: A-F
Compulsory assignments: Approved working paper and oral presentation
Recommended previous knowledge: See required previous knowledge.
Required previous knowledge: Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.
Learning objectives: * To develop knowledge about methodological issues related to empirical research on childhood as a social phenomenon.
* To get insight into methodological discussions related to children's perspectives and children as informants.
* To develop knowledge about different qualitative as well as quantitative methods.
* To develop reflexivity about the relation between theoretical perspectives, methodology and research questions/topics.
Academic content: The course will provide an overview and theoretically discuss the various steps in the research process, such as collecting data, analysis, interpretation and the making of a research text. The possibilities and limitations related to the use of different methods will be addressed. Children's perspectives within research involve the exploration of children's everyday lives from children's perspectives and experiences. A grassroot's perspective like this entails a methodological orientation towards children as informants in the research process and calls for the use of a variety of qualitative methods. These include various forms of interviews, observations, visual methods and fieldwork. Methodological problems such as accessing children as informants and research ethics will be addressed. In addition, historical methods and discourse analysis of texts, documents and social practices will be included. Though the main emphasis is on qualitative research, various quantitative methods and the combination of qualitative and quantitative approaches will be addressed. The lectures will draw on ongoing empirical research based at the centre as well as from the international milieu of children and childhood researchers.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total lecture hours: 30 hours, total seminar hours: Up to 16 hours. The course consists of: (1) A common introduction with lectures. (2) A seminar with presentation and discussion of the students' working papers. The student will be required to do a practical exercise (e.g. an interview, text analysis and/or observation). Based on this exercise, the student must write a working paper. The students can choose between doing the exercise and writing the working paper individually, or together with 1-2 of their fellow students. Each student will be required to comment on another student's working paper.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	6.0 HOURS	1/1	

BARN3300 Children and Development in the South

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: None
Recommended previous knowledge: See required previous knowledge.

Required previous knowledge: Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.
Learning objectives: Studies in social sciences focus on gender relations and its implication to societal development. Little attention has been paid to the importance of age as a biological attribute as well as a social and cultural construct. Children and youth comprise over half of Africa's total population. This proportion is even higher in some societies, casting special sets of challenges and making available unique packages of opportunities to development. Paradoxically, children and youth are marginalized from the socio-economic and political spheres of life.
This course examines the life experiences of children and young people in the light of the new interdisciplinary field of childhood and youth studies. It is designed to develop a broad understanding of childhood within diverse social, cultural, economic and political contexts. A particular emphasis will be on African childhoods.
Academic content: Reflecting a concern with issues of social relevance, the course moves beyond the stereotypes to explore the socially and spatially uneven impacts of globalization processes and the ways in which these are experienced by, and responded to, both individually and in collectivity. It also includes children as social participants in economic, social and cultural reproduction of society.
Areas of focus include:
* Representations of childhoods in the South.
* Children experiencing orphanhood.
* Children, violence and armed conflicts.
* Children as social and political participants.
* Children as migrants.
* Children as refugees.
* Children in families.
* Children and play.
* Child labour and/or working children?
* Structural adjustment programs and livelihood strategies of families.
* Childhood poverty, health and welfare.
* Children and NGOs.
* Children as social participants in community building.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total lecture hours: 20 hours, total seminar hours: Up to 12 hours. The course consists of: (1) A common introduction with lectures. (2) A seminar with presentation and discussion of the students' working papers. The students can choose between writing their working paper individually, or together with 1-2 of their fellow students. Each student will be required to comment on another student's working paper.
Assessment: Written assignment/written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	2/3	
ASSIGNMENT		1/3	

BARN3400 Preparatory course, master’s thesis

Teaching: Spring: 7.50 Cr
Language of instruction: English
Grade: Pass/Fail
Compulsory assignments: None
Recommended previous knowledge: See required previous knowledge.
Required previous knowledge: The course is only for students accepted at MPhil in Childhood Studies.
Learning objectives: To generate basic knowledge of how to prepare and design scientific research projects. The students shall develop a research design, including an empirical study, which they are going to conduct as their master's thesis.
Academic content: The course will prepare the students for their work with the master's thesis. The various stages of the research process will be introduced, such as defining a research problem, how to make use of acquired knowledge of theory and methodology, how to analyse etc. During the course the students shall develop their master's projects. Each student's project will be discussed at the course. By the end of the course, a final project description shall be handed in.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total seminar hours: up to 18 hours. Form of assessment: Approved oral presentation and project description.
Assessment: Oral examination/Report

Forms of assessment	Time	Percentage	Deadline
ORAL EXAMINATION		1/2	
APPROVED REPORT		1/2	

BARN3900 Master's thesis

Teaching: 1st sem. autumn, 2nd sem. spring: 60.0 Cr
Language of instruction: English
Grade: Letter grade
Compulsory assignments: Empirical study, oral presentation, chapter drafts, ind. supervision
Required previous knowledge: The course is only for students accepted at MPhil in Childhood Studies.
Learning objectives: To give the students training in carrying out a scientific study related to children and childhood.
Academic content: The students themselves choose their topic for the master's thesis, which shall be an autonomous, scientific study based on concrete research questions related to children and childhood. The thesis should be 80-120 pages (Times New Roman 12, space 1.5).
During the 1st semester the student is asked to write a contract with his/her supervisor suggesting a tentative topic for a thesis. A project description shall be handed in during the 2nd semester.
The thesis should normally include an empirical study. The data collection is expected to be finished by the middle of the 3rd semester. The students are recommended to include the summer between 2nd and 3rd semester for data collection, if necessary. The thesis is expected to be completed within four terms from the admission to the course. Supervision will not be given beyond this.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: The students shall take part in a seminar with emphasis on theoretical and practical issues related to the writing of a master's thesis. All students shall present their thesis work at the seminar. The students are also expected to hand in chapter drafts during their writing period, and they will be given individual supervision.
Form of assessment: Master's thesis and oral exam. The oral exam is used to adjust the grade given for the thesis.
Assessment: Thesis

Forms of assessment	Time	Percentage	Deadline
THESIS		1/1	

Electives

Department of Social Anthropology

AFR3000 Africa and Development

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: None
Required previous knowledge: Bachelor's degree.
Learning objectives: The course will mediate perspectives on Sub-Saharan Africa in a globalized world.
Academic content: Sub Saharan Africa is today facing a range of challenges. Compared to other parts of the world Africa is still relatively marginalized, and it has been argued that the traditional social organization and culture of Africa is the major obstacle for development and higher degree of integration into the world community. The course will present theoretical perspectives on the contrast between traditional social and cultural forms and the increasing globalization, and discuss the statement that the marginalized situation of Africa is a result of traditional African values.
Teaching methods and activities: Lectures and seminars (up to 18 hours)
The course may be offered in English if necessary.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

Department of Geography

GEOG3506 Geography, Health and Development

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: SVGEO331: 7.50 Cr
Grade: A-F
Compulsory assignments: Approved term paper and presentation
Recommended previous knowledge: See formal requirements.
Required previous knowledge: GEOG1000-1006 or the equivalent.
Learning objectives: The course aims to give a broad overview of geographical perspectives on health with two main focuses:
1) Health status, disease/injury and risk/risk factors.
2) Geography of health services at different levels, with emphasis on demand and use, availability and accessibility, prevention, and treatment.

Academic content: The main emphasis of the course is on the situation in developing countries, but more general development trends in health and health services in different parts of the world are also covered. As well as a common core curriculum, two in-depth courses (curriculum variations) are offered: one that studies developing countries' perspectives in more detail, and a guideline for studying westernized countries (among which Norway is central). The course covers studies in quantitative and qualitative method traditions.
Part of the study is based on student's own reading which forms the foundation for carrying out the semester essay. This is presented at a seminar. A seminar is also arranged on searching for medical and health literature in libraries and databases (3 hours). The semester essay and presentation must be approved before the written examination can be taken.
Course materials: Given at the start of the semester.
Teaching methods and activities: 20 hours lectures, 8 hours seminars.
Compulsory activity: Approved term paper and presentation.
Form of assessment: 4 hour written exam.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

GEOG3515 Environment, Development and Changing Rural Livelihoods

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: Groupwork and presentation
Required previous knowledge: Bachelor in Geography. Other relevant qualifications can be accepted upon approval by the Department of Geography.
Learning objectives: The course will explore different conceptualisations and (mis-) understandings of the links between development, environment and environmental change and (rural) livelihood in African and Asian societies. Among the topics covered by the course: History of geographical thought: From environmental determinism to political ecology. Social nature; Social constructivism and environmental narratives. Institutions, norms and collective action and the idea of the 'community' as basis for natural resource management. Hazards and vulnerability. Vulnerability; a useful concept or just another way of labelling: Vulnerability analysis in practice. Environmental conservation and development; from 'Fortress conservation' to 'Conservation and development'? Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. Environment and conflicts. The 'Environment' as basis for conflicts.
Academic content: The course will explore different conceptualisations and (mis-) understandings of the links between development, environment and environmental change and (rural) livelihood in African and Asian societies. Among the topics covered by the course: History of geographical thought: From environmental determinism to political ecology. Social nature; Social constructivism and environmental narratives. Institutions, norms and collective action and the idea of the 'community' as basis for natural resource management. Hazards and vulnerability. Vulnerability; a useful concept or just another way of labelling?: Vulnerability analysis in practice. Environmental conservation and development; from 'Fortress conservation' to 'Conservation and development'? Changing rural livelihoods and livelihood analysis; from farm to non-farm and implications for the rural environments. Environment and conflicts. The 'Environment' as basis for conflicts.
Teaching methods and activities: Lectures: 18 hours. Groupwork and presentations (obligatory)
Assessment: Written

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

GEOG3516 Humanitarianism: Theory and Practice

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Grade: A-F
Compulsory assignments: Assignment and introductory seminar
Recommended previous knowledge: The course is given at MA-level, a background equivalent to Bachelor in social sciences or extensive field experiences is recommended.
Learning objectives: This course will examine the principles underpinning humanitarian aid and investigate how they are being realized in the field. Embedded in humanitarian action are a number of contentious issues regarding the relationships between political aims of donors and host governments and the people concerned. The course will stress the relationship between theory and practice and how to deal with operational dilemmas on the ground.
Academic content: The lectures will introduce principles and theories of humanitarian action; the various actors involved and the relationship between them; the emergence of humanitarian regimes; the relationship between political development and humanitarian practice; humanitarianism and forced migration; gender, ethnicity and humanitarian challenges; ethical dilemmas, aid conditionality and the Do No Harm and Relief to Development concepts. The lectures are internet based with one day compulsory introductory seminar. For the students present at NTNU some seminars relating to the internet based lectures will be held. Assignments are approved/not approved.

Teaching methods and activities: Internet based, equivalent to 16 hours, 1-day compulsory introductory seminar, seminars for the students present at NTNU.
Compulsory activity: Assignments and introductory seminar
Form of assessment: Home exam (5 days).
Assessment: Home examination

Forms of assessment	Time	Percentage	Deadline
HOME EXAMINATION		1/1	

GEOG3561 Gender and Social Change

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: SVGEO361: 7.50 Cr
Grade: A-F
Compulsory assignments: None
Required previous knowledge: For Norwegian students: Bachelorgrad or 'mellomfag' in Geography. Other relevant qualifications can be accepted if approved by the Department.
Learning objectives: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues.
Academic content: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues. The course seeks to combine an interdisciplinary and subject-specific approach. It aims at outlining different perceptions of gender within different social scientific traditions. Theoretical and methodological problems related to the use of gender as an analytical category and how these are manifested in social scientific research are examined. The course also includes presentations of empirical material from gender-specific research within the field of geography and other social sciences.
Teaching methods and activities: Teaching method: 18 hours lectures and seminars with active involvement from students.
Form of assessment: Written exam (4 hours)
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

Department of Psychology

PSY3082 Relational and Cultural Aspects of Development

Teaching: Autumn: 15.0 Cr
Language of instruction: English
Grade: Pass/Fail
Compulsory assignments: None
Recommended previous knowledge: See requirements
Required previous knowledge: Requirements: Bachelor degree in Psychology or equivalent. Students admitted to MPhil in Childhood Studies are exempted from this requirement.
Learning objectives: The course will provide the basis conceptual tools for the understanding of interpersonal, social, and cultural aspects of change processes underlying human development.
Academic content: In the enlarged sense already described above this basic course on human development comprises four blocks, which introduce selected theoretical and empirical themes pivotal to a comprehensive understanding of human change processes. Specifically, they will provide a basis for the understanding of interpersonal, social and cultural processes underlying the development of individuals and groups. The detailed content of each block might vary from one semester to another.
Course materials: Syllabus: 800 p
Teaching methods and activities: Teaching semester: Autumn
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Block teaching: lectures and seminars
Examination: Four papers (Pass/Fail)
Deadlines: Submission of papers 2 weeks after end of block teaching.
Assessment: Assignment

Forms of assessment	Time	Percentage	Deadline
ASSIGNMENT		1/1	

Department of Social Anthropology

SANT3502 Anthropological Perspectives on Sex and Gender

Teaching: Autumn: 7.50 Cr
Language of instruction: The course will be offered in English if necessary
Credit reduction: SVSANT342: 7.50 Cr
Grade: Letter grade
Compulsory assignments: None
Recommended previous knowledge: See formal requirements.
Required previous knowledge: Bachelor's degree or the equivalent.
Learning objectives: To acquire analytical skills in the study of gender relations.
Academic content: Gender is an important organizing principle in society and culture. This course provides an insight into how gender is constructed and maintained at different levels - socially and symbolically. The course takes feminist theory as its point of departure and discusses gender in relation to themes such as kinship, modernity and the body.
Teaching methods and activities: Lectures/seminars (approx. 18 hours).
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

Norwegian Centre for Child Research

BARN3101 Social Studies of Children and Childhood: Research Perspectives

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: BARN3001: 7.50 Cr. BARN3100: 7.50 Cr.
Grade: A-F
Compulsory assignments: Approved working paper and oral presentation
Recommended previous knowledge: See required previous knowledge.
Required previous knowledge: Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.
Learning objectives: * To generate knowledge about childhood as a social phenomenon, children's life-worlds, welfare and the politics of childhood in changing societies.
* To provide an historical overview of essential research perspectives in social studies of children and childhood.
* To introduce key debates concerning the research of children's everyday life and culture, and contemporary perspectives on childhood.
* To discuss how cultural representations of childhood are dynamic and change with both time and space.
Academic content: The course addresses changing paradigms in child research, including childhood as development and childhood as socially constructed. Issues both of a structural nature, which has an implication for children's everyday lives and childhood, as well as children's agency in defining and giving meaning to their lives and activities, will be discussed. Discourse theoretical perspectives, challenging the split between agency and structure, will be included. The central issues are childhood and related themes such as generation, gender, life-course, ethnographies of childhood, identity and ethnicity as these take form through varying processes like globalisation, institutionalisation, consumption and commercialisation.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total lecture hours: 18 hours, total seminar hours: up to 12 hours. The course consists of: (1) A common introduction with lectures. (2) A seminar with presentation and discussion of the students' working papers. The students can choose between writing their working paper individually, or together with 1-2 of their fellow students. Each student will be required to comment on another student's working paper.
Lectures will be held in English.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

BARN3102 Children's Rights

Teaching: Autumn: 7.50 Cr
Language of instruction: English
Credit reduction: BARN3100: 7.50 Cr.
Grade: A-F
Compulsory assignments: Approved working paper and oral presentation
Recommended previous knowledge: See required previous knowledge.
Required previous knowledge: Admittance to the course requires a bachelor's degree in a social science or humanities discipline, or equivalent.

Learning objectives: * To generate knowledge about discourses on children's rights.
* To discuss the global discourses on the UN Convention on the Rights of the Child and children's rights to provision, protection and participation.
* To develop knowledge about the dynamic relationship between globalisation processes and children's lives in different parts of the world.
Academic content: The course presents an overview of different children's rights declarations in a historical perspective. It discusses the UN Convention on the Rights of the Child and its implications for children's lives in different parts of the world. Children's lives and welfare in the light of changing policies and globalisation processes will be explored.
The topics are:
* Children as social participants in economic, social and cultural reproduction of society.
* NGO's role in the implementation of the UN Convention on the Rights of the Child.
* Migration and ethnicity.
* Childhood, time and space.
* Childhood as symbolic space.
* Children as consumers.
Course materials: Information will be given at the beginning of the semester.
Teaching methods and activities: Total lecture hours: 18 hours, total seminar hours: up to 12 hours. The course consists of: (1) A common introduction with lectures. (2) A seminar with presentation and discussion of the students' working papers. The students can choose between writing their working paper individually, or together with 1-2 of their fellow students. Each student will be required to comment on another student's working paper.
Lectures will be held in English.
Assessment: Written examination

Forms of assessment	Time	Percentage	Deadline
WRITTEN EXAMINATION	4.0 HOURS	1/1	

Credit adjustment due to overlap in content

BARN3100	BARN3001	7.5 credits
BARN3100	BARN3101	7.5 credits
BARN3100	BARN3102	7.5 credits
BARN3101	BARN3001	7.5 credits
BARN3200	BARN3002	7.5 credits

MASTER OF SCIENCE IN EXERCISE PHYSIOLOGY/SPORTS SCIENCES

Outline of the programme
The MSc degree in Exercise Physiology is a two-year full-time programme.
The MSc is a research and thesis-based integrated graduate degree programme in Exercise Physiology at the Faculty of Medicine. This is a 120-credit, two-year period of study. It is exclusively concerned with basic research training and comprises compulsory courses together with optional courses dependent upon the research specialization of students. The programme is connected to ongoing research and has a focus on training interventions and its basic mechanisms as well as effects in preventive medicine, treatment, rehabilitation and ageing, and in sports performance. The Master of Science degree is a requirement for further research work at PhD level within the Exercise Physiology programme. Teaching and tutoring is given in English.

The first semester is primarily based on theory and lectures. From the second semester most attention is directed towards preparing for carrying out an experiment representing work at the forefront of the research in Exercise Physiology in close co-operation with the professors in the research group. The quality of research is high, and the research project is expected to contain data of a quality that makes international publication possible.

Course code	Course title	Credits	Semester
MFEL1010	Introduction to medicine for non-medical students	7,5	1/autumn
SPO3020	Training Circulation and Oxygen Consumption	7.5	1/autumn
SPO3030	Training Muscle and Force Production	7.5	1/autumn
SPO3040	Environmental Adaptations	7.5	1/autumn
SPO3050	Research Methods in Exercise Physiology	15	1/spring
SPO3060	Specialization in Exercise Physiology	15	1/spring
SPO3070	Research Apprenticeship in Exercise Physiology	15	2/autumn
SPO3901	Thesis in Exercise Physiology	45	2/autumn

Course descriptions

MFEL1010 Introduction to medicine for non-medical students
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: The course will focus on the body's composition and function (anatomy/physiology) from cell to organ level, and the causes of the most common disorders like heart attack, cancer, chronic obstructive pulmonary disease and brain stroke. The course will further pay attention to how the health care system works and how patients are examined and treated when they consult the doctor with symptoms. The use of technology in medicine will be emphasized. Ethical considerations which may arise when using medical technology and informatics will also be discussed.

SPO3020 Training Circulation and Oxygen Consumption
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Circulatory function, supply and demand limitations of oxygen to working muscle. Limitations and adaptations in patients and athletes. Training methods and their application to various limitations.

SPO3030 Training Muscle and Force Production
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Muscle architecture and differences in the population. Changes related to age and diseases. Limitations and functional adaptations in patients and athletes. Training methods for neural adaptations and protein synthesis. Neuromuscular basis for motor skill acquisition.

SPO3040 Environmental Adaptations
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Circulatory and functional responses to a changed environment, such as diving, high altitude/mountaineering, exercise and training in cold and hot environments. Acute and chronic responses and adaptation to training.

SPO3050 Research Methods in Exercise Physiology
Credits: 15
Teaching semesters: Spring
Learning outcomes: Introduction to theories of science, methods in Exercise Physiology research and basic statistics. Normally standard courses given at Faculty of Medicine constitutes the basic part of the course.

SPO3060 Specialization in Exercise Physiology
Credits: 15
Teaching semesters: Spring
Learning outcomes: Specialization within the area of research planned for the thesis. Review of research literature, and writing a review article in the area of specialization for the thesis.
Compulsory literature: A minimum of 30 articles from peer-reviewed scientific journals.

SPO3070 Research Apprenticeship in Exercise Physiology
Credits: 15
Teaching semesters: Autumn
Learning outcomes: This course contains the most usual data collection techniques in the area of Exercise Physiology. The student report consists of a pilot experiment to ensure that data collection techniques or methods planned for the thesis are reliable and valid.

SPO3901 Thesis in Exercise Physiology
Credits: 45
Learning outcomes: The thesis should be within the area of the research expertise among the available supervisors. The theme has to build upon the specialization in EP 3060, and the research apprenticeship in EP 3070, and will be course to approval by the board of Professors. The thesis is to be in the format of an article in a peer reviewed research journal, and will be course to external evaluation.

MASTER OF SCIENCE IN URBAN ECOLOGICAL PLANNING

Compulsory core courses:

Semester	Subject no.	Title	Autumn	Spring	Note
1.sem	AAR4525	Urban Ecological Planning in Developing Countries. Project work	15 Sp		3
1.sem	AAR4816	Urban Ecological Planning. Method	7,5 Sp		3
1.sem	AAR4820	Urban Ecological Planning. Theory	7,5 Sp		3
2.sem		Electives (see list below)		15 Sp	
2.sem	AAR5300	Urban Ecological Planning in Diverse Cultures		15 Sp	3
2.sem	AAR5250	Preparation for fieldwork for master's students		7,5 Sp	
3.sem	AAR5200	Analysis of Field Work for M.Sc. thesis in Urban Ecological Planning	15 Sp		
3.sem	FP4350	Planning theory and planning process skills	7,5 Sp		
3. sem		Electives (see list below)	7,5 Sp		
4.sem	AAR5400	Master In Urban Ecological Planning		30 Sp	

3) Not taught in 2006/2007

Course descriptions

AAR5200 URBAN ECOLOGICAL PL
Analysis of Field Work for MSc Thesis in Urban Ecological Planning
Lecturer: Lecturer: Professor Hans Christie Bjønness

Weekly hours:Høst: = 15.0 SP Language of instruction: English

Time: Teaching time and location will be announced on the web.

Grade: Letter grade

Compulsory assignments: Exercises

Recommended previous knowledge: A field work plan shall be presented for and approved by the course responsible and / or the appointed supervisor prior to the field work. The field work is for a two month period during the summer between the second and the third semester. The fieldwork should preferably be in the home country of the participant from a developing country. During the third semester the field work results shall be recorded, analysed and presented.

Evaluation: Evaluation based on pre-fieldwork plan, recording and analysis of field work results and presentation.

Assessment: Exercises

Form of assessment	Date	Time	Percentage	Exam. Support
Exercises		1/1		

AAR5400 MASTER URBAN ECO PL
Master of Science Thesis in Urban Ecological Planning
Lecturer: Professor Hans Christie Bjønness

Weekly hours:Spring: = 30.0 CrLanguage of instruction: English

Time: Teaching time and location will be announced on the web.

Grade: Letter grade

Compulsory assignments: None

Academic content: The thesis consists of a scientific presentation of a chosen topic. The thesis should be ca. 100 pages. The student must prepare a project proposal of at least 4 pages before the 15th February in the second semester. On the basis of the project proposal, a faculty member will be appointed as supervisor in accordance with the guidelines approved by the Board of the Department. The supervisor must be kept informed about the progress of the writing. Seminars with emphasis on theoretical and practical issues related to the writing of a master's thesis will be held during the first and the second year. Students are expected to present their thesis work for fellow students and faculty members at 2 seminars. It is recommended that students start to work on their thesis in their second semester. The last spring semester is fully devoted to the thesis.

Thesis evaluation: Thesis and presentation. The resentation is used to adjust the grade given for the thesis.

This course is only for students who are taking the full study in M.Sc. in Urban Ecological Planning.

Assessment: Thesis

Form of assessment	Date	Time	Percentage	Exam. Support
Thesis				

FP4350 PLAN THEORY PROCESS
Planning theory and planning process skills

Lecturer: Professor Tor Medalen
Weekly hours: Autumn: 3F+5Ø+4S = 7.50 Cr Language of instruction: English
Time: Teaching time and location will be announced on the web.
Grade: Letter grade
Compulsory assignments: None
Learning objectives: The objective of the course is for the students to obtain knowledge about the need for constructive co- operation in physical planning and that they should be able to organise practical project co-operation and citizen participation.
Required previous knowledge: None
Recommended previous knowledge: Some knowledge of Planning and Building Acts and methods in supirior and detailed planning
Academic content: The course will introduce the students to planning theory focusing on the planning process and citizen participation. The course will be based on planning in a democratic society emphasising methods of co-operation
Teaching methods and activities: Lectures and excercises
Course materials: The course will include a compendium with selected articles on plannning as a societal activity, planning theory and collaborative methods, including Lindblom's The Intelligence of Democracy and Schön's The Reflective Practitioner.
Assessment: Report/Written examination

Form of assessment	Date	Time	Percentage	Exam. Support
Written examination			50/100	
Approved report			50/100	

Electives:

Subject no.	Title:	Note	Autumn	Spring
AAR8100	Housing Theory and History	1	7,5 Sp	
GEOG3050	Theories of Social Change	1	15 Sp	
GEOG3561	Gender and Social Change	1	7,5 Sp	
GEOG3505	Landscape and Planning	1	15 Sp	
GEOG3506	Geography, Health and Development	1	7,5 Sp	
AAR5250	Preparation for fieldwork for master's student	2,3		7,5 Sp
AAR4945	Planning and Construction in Developing Countries	2		7,5 Sp
AAR5260	GIS in Urban Planning	2		7,5 Sp

1) Autumn: Elective courses offered during the autumn can only be selected if a study plan tailored to the M.Sc. thesis subject is agreed with the Faculty, and recommended by the M.Sc. thesis supervisor and course responsible
2) Spring: Elective courses amounting to 15 Sp shall be selected from the list above
3) Not taught in 2006/2007

AAR4945 PLANN IN DEVELOP COUNTRIES
Planning and Construction in Developing Countries

Lecturer: Professor Hans Christie Bjønness
Lecturer: Weekly hours: Spring: = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: None
Learning objectives: - The course is to give an introduction to basic preconditions and applicable knowledge for carrying out planning, infrastructure and construction activity on a sustainable basis in developing countries.
- Methods for project-planning of developing measures are to be mastered and practised.
Required previous knowledge: The course gives priority to course AAR4525 Urban Ecological Planning in Developing Countries. Project Work, and course AAR4820 Urban Ecological Planning. Theory, and AAR4816 Urban Ecological Planning, Method.

Academic content: - Alternative theories of development, "eco-development" and principles for territorial social development and planning.
- Settlement and housing problems, and politics in developing countries.
- The role of infrastructure in development and urban planning.
- Construction and use of alternative materials in developing countries.
- Cultural continuity and diversity in development.
- Planning during crises and post-catastrophe planning.
- The roles of CBOs, NGOs and INGOs in development.
- Participant-, problem-, and goal-based project-planning methods (LFA) are to be mastered and applied in group work. The project proposals are to written according to UN/NORAD template.
- Project evaluation.

Teaching methods and activities: The course is given in cooperation with several departments at the Faculty of Architecture and Fine Art, the Faculty of Engineering Science and Technology, and the Faculty of Social Science and Technology Management. Weight is placed on interdisciplinary seminars with introductory speakers from other faculties and specialists with experience in development-related issues. Case studies are presented and discussed. One exercise is to be carried out as group work.
The course is held together with AAR4230.
Compendium with course literature.

Assessment: Written

Form of assessment	Date	Time	Percentage	Exam. Support
Written examination		1/1	D	

AAR5260 GIS IN URBAN PLANN
GIS in Urban Planning

Lecturer: Associate Proffesor Alf-Ivar Oterholm
Weekly hours: Spring: = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade
Compulsory assignments: Exercises

Academic content: The course is an introduction to Geographical Information Systems (GIS). Theory, methods, techniques and applications are illustrated in lectures, seminars, demonstrations and practical exercises. Issues that will be covered are: GIS concept, the raster and vector principles, data capture, data modelling, handling of attribute tabular data, spatial analysis and query, mapping layout etc.

Course material: Heywood, Ian & al., 2002: An Introduction to Geographical Information Systems.

Assessment: Oral

Form of assessment	Date	Time	Percentage	Exam. Support
Oral examination			1/1	

AAR8100 HOUSING THEORY AND HISTORY
Housing Theory and History

Lecturer: Professor Sven Erik Svendsen
Weekly hours: 1 term (autumn semester)

The course is an introduction to the development of housing in Europe mainly in the last century, to theoretical background of different house types and forms and the to the premises for current housing design and production.
Annoucement at course start.
The course will be conducted as a series of lectures and seminars with related litteratur studies. One paper with a topic related to the course content to be written at the end of the semester.
The objective is to give an increased understanding of the development of housing and house types, and the premises for the output in the sector.

GEOG3050 THEOR SOC CHANGE
Theories of Social Change

Lecturer: Professor Ragnhild Lund
Weekly hours: Autumn: 28FSpring: 8Ø = 15.0 Cr Language of instruction: English
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Assignment, seminar presentation and term paper

Learning objectives: Students shall broaden their knowledge of theories of social change through an introduction to different analytical perspectives in development theory and practise.

Academic content: GEOG 3050, Theories of Social Change and Development, is compulsory for students at the

MPhil in Development Studies. The course serves as an introduction to the main theme of the MPhil programme. Students shall broaden their knowledge of theories of social change and development. Different theories will be introduced and examined with respect to key concepts, perspectives and key development challenges of our times such as poverty alleviation and growth, globalisation and marginalisation, gender and development, civil society mobilisation and other post-development discourses. The course draws on a wide range of practical and empirical knowledge, as the lecturers represent several disciplines within the social sciences and many have cross-cultural experience.

During the autumn term the course consists of lectures and one compulsory assignment, while the spring term consists of seminars/group work and term paper writing. The term paper should serve as an epistemology paper for the thesis and should be presented at a final seminar (compulsory).

Teaching methods and activities: Lectures, seminars and term paper. Exam: written exam 6 hours (50%) and term paper (50%)

Course materials: Will be given when the semester starts.

Assessment: Written

Form of assessment	Date	Time	Percentage	Exam. Support
Written examination			1/2	
Assignment			1/2	

GEOG3505 LANDSCKAPE PLANNING

Landscape and Planning

Lecturer: Professor Michael R.Handley Jones

Weekly hours: Autumn: 30F = 15.0 CrLanguage of instruction: English

Time: Teaching time and location will be announced on the web.

Grade: Letter grade Compulsory assignments: Approved term paper/project work.

Learning objectives: The course aims to give insight into theoretical and methodological problems in connection with landscape seen in relation to planning.

Recommended previous knowledge: See formal requirements.

Academic content: The course studies the concept of landscape, landscape values, and theoretical and methodological problems in landscape planning and management. It is offered to students on the Department?s two MA degree programs. Students taking the MA in Social Change write an individual semester essay based on the course literature. Students taking the MA in Geography participate in a project where, through fieldwork, interviews and document analysis, they analyse a concrete planning situation in which landscape and environmental values are involved. The project is normally undertaken as group work. The aim of the project is to give insight into how and to what extent consideration of the landscape and environment is included in planning and management and to illustrate what problems relating to landscape and environment are encountered in the general planning process. The lectures will normally be given in English. For students taking the Norwegian master?s course, the project is conducted in Norwegian, and the group report will normally be written in Norwegian.

Teaching methods and activities: Teaching methods and activities: Teaching method and activities: 30 hours lectures.

Compulsory activity: Approved term paper/project work.

Form of assessment: Oral exam.

Assessment: Oral

Form of assessment	Date	Time	Percentage	Exam. Support
Oral examination			1/1	

GEOG3506 GEOG HEALTH DEVELOP

Geography, Health and Development

Lecturer: Associate Proffesor Stig Halvard Jørgensen

Weekly hours: Autumn: 2F+1Ø+9S = 7.50 Cr Language of instruction: English

Time: Teaching time and location will be announced on the web.

Grade: Letter grade

Compulsory assignments: Approved term paper and presentation

Learning objectives: The course aims to give a broad overview of geographical perspectives on health with two main focuses:

1) Health status, disease/injury and risk/risk factors.

2) Geography of health services at different levels, with emphasis on demand and use, availability and accessibility, prevention, and treatment.

Recommended previous treatment: See formal requirements.

Academic content: The main emphasis of the course is on the situation in developing countries, but more general development trends in health and health services in different parts of the world are also covered. As well as a common core curriculum, two in-depth courses (curriculum variations) are offered: one that studies developing countries? perspectives in more detail, and a guideline for studying westernized countries (among which Norway is central). The course covers studies in quantitative and qualitative method traditions.
Part of the study is based on student?s own reading which forms the foundation for carrying out the semester essay. This is presented at a seminar. A seminar is also arranged on searching for medical and health literature in libraries and databases (3 hours). The semester essay and presentation must be approved before the written examination can be taken.
Teaching method and activities: 20 hours lectures, 8 hours seminars.
Compulsory activity: Approved term paper and presentation.
Form of assessment: 4 hour written exam.
Course materials: Given at the start of the semester.

Assessment: Written

Form of assessment	Date	Time	Percentage	Exam. Support
Written examination			1/1	C

GEOG3561 GENDER SOC CHANGE
Gender and Social Change
Lecturer: Associate Proffesor Cathrine Brun
Weekly hours: Autumn: 2F+1Ø+9S= 7.50 CrLanguage of instruction: English
Time: Teaching time and location will be announced on the web.
Grade: Letter grade
Compulsory assignments: None
Learning objectives: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues.
Academic content: The course offers an introduction to the main themes of international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues. The course seeks to combine an interdisciplinary and subject-specific approach. It aims at outlining different perceptions of gender within different social scientific traditions. Theoretical and methodological problems related to the use of gender as an analytical category and how these are manifested in social scientific research are examined. The course also includes presentations of empirical material from gender-specific research within the field of geography and other social sciences.
Teaching methods and activities: 18 hours lectures and seminars with active involvement from students. Form of assessment: Written exam (4 hours)

Assessment: Written

Form of assessment	Date	Time	Percentage	Exam. Support
Written examination			1/1	

MASTER OF SCIENCE IN CONDENSED MATTER PHYSICS AND BIOPHYSICS

Outline of the programme
The Master of Science programme (MSc) in Condensed Matter Physics and Biophysics at NTNU is designed to train the student in fields of physics related to these topics, and in scientific work and research. The programme is relevant for the strategic area Materials at NTNU. The Department of Physics has strong research groups in Condensed Matter Physics and in Biophysics.

The Master of Science programme in physics consists of two years corresponding to 120 credits including a thesis of 60 credits. The rest of the programme is scheduled courses of 7.5 credits. The courses should be chosen in topics which are related to the specialization in the thesis work and in collaboration with the supervisor. See below for the different specialization areas and recommended courses.

Year	Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
2	Spring	Self study	Master´s thesis	Master´s thesis	Master´s thesis
2	Autumn	Optional*	Master´s thesis	Master´s thesis	Master´s thesis
1	Spring	Optional*	Optional*	Optional*	Master´s thesis
1	Autumn	Optional*	Optional*	Optional*	Master´s thesis

Optional: See list below for eligible courses. To be discussed with the supervisor.

Examination: For each course an examinati on, oral or written, will be arranged at the end of the semester in which the course is offered. However, the exam in one of the courses or in a specially selected curriculum from scientific articles or books relevant for the thesis work must be taken as an oral exam as part of the final examination. The thesis must be submitted at least one month before this final examination, during which the candidate will also be questioned on the content of the thesis. The set of courses for the master´s degree and the topic for the thesis will be approved by the Department after submitting the final examination form 8 weeks before the exam.

For all examinations and also for the thesis the scale of grading is from A (highest) to E (lowest), or F (fail).

Topics offered in the programme
The activities in Condensed Matter Physics cover both experimental and theoretical topics. Experimental activities are focused on physical properties of different materials, such as polymers, molecular crystals, functional oxides, magnetic materials, metals, semiconductors, complex materials, using a variety of experimental techniques. The activities also include experimental studies of structural, electronic, mechanical and optical properties of surfaces. Applied activities exist within solar energy - and environmental physics, and optical measurement techniques are developed. Theoretical studies are performed in different subjects such as soft condensed matter physics, superconductors, self-consistent equations of state, liquid crystals and solid-solid transitions, as well as on the theory of strongly correlated fermion systems, in particular low-dimensional ones. Fermi liquids, heavy fermion systems, quantum magnets, non-fermi
liquids, gauge-field theories of strongly correlated systems, novel phase transitions and quantum phase transitions are studied.

The activities in Biophysics are directed towards bioprocesses on molecular, cellular or organism levels.
Both experimental and theoretical investigations are possible as well as simulations and modelling studies.
Research for an MSc thesis may be carried out in the following broad fields: Biophysics of photoprocesses of cells and molecules; electromagnetic interaction with cells cells and organisms; biophysical control systems analysis (e.g. balance systems); light spectroscopy studies, EPR and NMR studies; biomolecular studies by atomic force microscopy; cellular studies by flow cytometry and confocal microscopy; biophysical problems in medical technology

Plan of study

1 Year autumn
TFY4220 Solid state physics
FY2302 Biophysics I
One of the courses is compulsory depending on specialization.

TFY4300 Energy and Environmental Physics
FY3006 Sensors and Transducers

1 Year spring
TFY4245 Solid State Physics, Advanced Course
TFY4255 Material Physics
TFY4205 Quantum Mechanics
TFY4210 Applied Quantum Mechanics
TFY4280 Signal Analysis
FY3201 Atmospheric Physics
TFY4195 Optics
TFY4235 Numerical Physics

2 Year autumn
FY3114 Functional Materials
TFY4265 Biophysical Micromethods.

2 Year spring
Self-study course to be designed by the supervisor.

Course descriptions

FY2302 Biophysics I
Credits: 7.5
Course responsibility: Professor Thor Bernt Melø
Recommended previous knowledge: Knowledge of elementary physics corresponding to one year study of physics.
Course content: The subject is a general introduction to the essential processes of life, based on principles from physics. Transport processes, structure and function of proteins and deoxyribonucleic acids and membrane processes will be discussed. A few measurement techniques will also be covered.
Course materials and media: Web-addresses and lecture notes. The material can be accessed through the home page of the course.
Teaching methods: Lectures, laboratory- and calculus excercises using EXCEL.
Learning outcomes: An introduction to aspects of modern biophysics.

TFY4220 Solid State Physics
Credits: 7.5
Course responsibility: Professor Steinar Raaen
Recommended previous knowledge: Some knowledge of physics, mathematics and chemistry.
About 2 years of introductory physics and mathematics
Course content: Atomic structure; Order and disorder, Lattices and unit cells, Crystal directions and planes, Non-crystalline structures, Interatomic bonding, Van der Waals solids, Metallic solids, Ionic solids, Covalent solids, Symmetry, Reciprocal space, Brillouin zones, Structure determination. Lattice vibrations; The continuum approximation, Vibrations of periodic systems, Quantization of vibrational modes: Phonons, Crystal momentum, Heat capacity, Anharmonicity. Static electron systems;Free electron gas, Fermi-Dirac distribution, Electrons in periodic solids, Nearly-free-electron model, Brillouin zones and energy bands, Tight-binding approximation. Dynamic electron systems; Free-electron gas, Periodic solids, Intrinsic semiconductors, Extrinsic semiconductors.
Course materials and media: Stephen Elliott: The Physics and Chemistry of Solids, Wiley Chicester, 1998.
Teaching methods: Lectures, homework problems and compulsory laboratory exercises. The final grade is based on a midsemester examination (20%) and a final exam (80%). The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: Introduction to solid state physics. This is the first of two courses in introductory solid state physics.

TFY4300 Energy and Environmental Physics
Credits: 7.5
Course responsibility: Associate Professor Turid Worren
Portefolio assesment: Written examination (4 Hours) and midterm examination.
Recommended previous knowledge: General knowledge in physics.
Course content: The energy budget of the earth, the green house effect, radiation, atmospheric changes due to human activities. Methods (especially optical) for atmosphere observations. Methods and the physical basis for exploitation of renewable energy sources, such as wind, ocean waves, solar radiation, geothermal energy and bio mass; costs and environmental effects. Nuclear power technologies and their environmental impact.
Course materials and media: Will be annonunced at the beginning of the term. Web based information from energy institutions and reserach institutes. The course uses "It's learning".
Teaching methods: Lectures and exercises. The four laboratory exercises are compulsory. The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: The course gives a short introduction to general energy and environmental issues, with emphasis on renewable energy sources and the effect on climate and environment caused by traditional energy use.

FY3006 Sensors and Transducers
Credits: 7.5
Course responsibility: Professor Kalbe Razi Naqvi
Written examination: 4 hours
Assessment: Approved assignment
Recommended previous knowledge: University level physics.
Course content: The terminology used for characterising the performance of sensors. Discussion of the physical phenomena and devices which can be used for measuring displacement, velocity, acceleration, force, pressure, flow, strain, temperature, radiation and concentration of chemical species.
Techniques for improving the signal-to-noise ratio.
Course materials and media: Distributed at the start of the semester.
Teaching methods: The basic principles will be explained through lectures and accompanying reading material. Three or four laboratory exercises, an experimental project, and an assignment involving literature survey form integral parts of the curriculum.
Learning outcomes: To provide an introduction to the workings of sensors and transducers used in modern instruments, placing particular emphasis on commercially available sensors.

TFY4245 Solid State Physics, Advanced Course
Credits: 7.5
Course responsibility: Professor Jon Otto Fossum
Written examination: 4 hours
Assessment: Approved assignments
Recommended previous knowledge: Continuation of TFY4220 Solid State Physics
Course content: Electrodynamics, metals, superconductivity, semiconductors, dielectric and magnetic properties, piezoelectricity, ferroelectricity, dia. and para- magnetism, ferro- and antiferro- magentism, magnetic resonance, reduced dimensionality, structure and scattering, crystals, liquid crystals, disordered materials, defects, phase transitions, critical phenomena, mean field theory. linear response theory, fields and susceptibilities, microscopic dynamics.
Course materials and media: Stephen Elliott: The Physics and Chemistry of Solids, Wiley, 1998, parts of the book not covered in TFY4220 Solid State Physics . Gert Strobl: Condensed Matter Physics, Springer Verlag 2004.
Teaching methods: Lectures and written problems. The course includes an compulsory project needed for admission to the final examination. The course will be given in English if students on the international master´s Program in Physics are attending the course.
Learning outcomes: Basic knowledge and understanding of of solid state physics related to experiments.

TFY4255 Material Physics
Credits: 7.5
Course responsibility: Professor Bjørn Torger Stokke
Written examination: 4 hours
Assessment: Approved assignment
Recommended previous knowledge: TFY4220 Solid state physics 1 or equivalent
Course content: i)Crystallography: Elementary introduction. Point and space groups.
International tables for crystallography ii)Diffraction: Kinematic theory for electron-, neutron- and x-ray diffraction. Ordered materials in polycrystalline and monocrystalline form. Determination of crystal structures. Partially ordered materials. Nano- and microstructures. Small angle scattering. Surfaces. iii) Imaging: Electron microscopy, SEM, TEM. X-ray microscopy, tomography, topography. Scanning surfacemicroscopies, STM, AFM, SNOM. iv)

Spectroscopy: XAFS and EELS. Inelastic x-ray and neutron scattering. v) Inhomogeneities: Defects, dislocations; multicomponent materials. Phase diagrams. The methods will be illustratedby eksamples like cerams, semiconductors, organic structures, and "modulated" materials, "quasicrystals, surface "reconstructions", adsorbates, amorphous materials, low-dimensional structures. Precipitates. Phase transitions.
Course materials and media: Emil J. Samuelsen: "Materials Physics; structure, diffraction and imaging" NTNU 2004.
Teaching methods: Lectures, exercises, laboratory work. Midsemester examination and full-time examination. The midsemester examination will count 20% and the final examination 80% for the marks, which will be converted into letter grades in the final marking of the subject. The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: Give insight in central methods for revealing the internal structure and dynamics of materials: Diffraction, imaging and spectroscopy

TFY4205 Quantum Mechanics
Credits: 7.5
Course responsibility: Post doc. Kiet Anh Nguyen
Written examination: 4 hours
Assessment: Approved assignment
Recommended previous knowledge: Courses TFY4215 Chemical Physics and Quantum Mechanics and TFY4250 Atomic and molecular physics or FY2045 Quantum Physics or similar.
Course content: Apprixmation methods in quantum mechanics. Angular momentum, spin. Identical particles. Time dependent perturbation theory, Fermi golden rule. Scattering theory, Born approximation. Dirac notation. Periodic potentials. Atoms and electrons in magnetic fields.
Course materials and media: P.C. Hemmer: Kvantemekanikk, Tapir, 2000. B. H. Bransden and C. J. Joachain: Quantum mechanics, Prentice Hall, 2000.
Teaching methods: The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: The course aims to give students advanced knowledge of methods and applications of quantum mechanics.

TFY4210 Applied Quantum Mechanics
Credits: 7.5
Course responsibility: Professor Bjørn Torger Stokke
Written examination: 4 hours
Recommended previous knowledge: The courses TFY4250 Atomic and molecular physics and TFY4205 Quantum mechanics or equivalent.
Course content: The Thomas-Fermi and Hartree-Fock methods for multiple fermion systems with applications on atoms and solids. The Born-Oppenheimer- and WKB-approximations. Semiclassical radiation theory, transition probabilities, dipole approximation, symmetries, photoelectric effect, spontaneous emission. Quantization of the electromagnetic field, photons. Quantized radiation theory, Thomson scattering, selection rules. Addition of angular momentum. The Dirac-equation, the angular momentum and magnetic momentum of the electron.
Course materials and media: P. C. Hemmer: Kvantemekanikk II, kompendium.P. C. Hemmer: Kvantemekanikk II, lecture notes.
Teaching methods: Lectures and homework problems. The course will be given in English if students on the international master´s programme in Physics are attending the course. The exam in August will most probably be written but may be changed to oral.
Learning outcomes: The students will be given an advanced and complimentary knowledge to the courses TFY4250 Atomic and Molecular Physics and TFY4205 Quantum Mechanics.

TFY4280 Signal Analysis
Credits: 7.5
Course responsibility: Professor Anders Carl G. Johnsson
Written examination: 4 hours
Recommended previous knowledge: Basic physics, mathematics and statistics
Course content: Description and analysis of stochastic and random signals, and measured signals with noise. Excitation-response analysis of linear systems, correlations and energy spectrum analysis.
Course materials and media: P. Denbigh: System analysis and signal processing with emphasis on the use of MATLAB (Addison-Wesley 1998). Lecture notes
Teaching methods: Lectures, assignments, computer laboratory excercises. The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: An introduction to the processing and analysis of experimental measurement signals and time series.

FY3201 Atmospheric Physics
Credits: 7.5
Course responsibility: Professor Berit Johanne Kjeldstad
Written examination: 4 hours
Assessment: Approved assignment
Recommended previous knowledge: Basic physics courses corresponding to one year study in physics at university/college level
Course content: The following topics are discussed: Composition and structure of the atmosphere; thermodynamic processes and stability. Scattering, absorption and transmission of solar and thermal radiation; dependence on aerosols, clouds and other variable components; greenhouse and climate effects. Spectral measurements of atmospheric radiation; polarization effects; monochromators, detectors and standards; general characterization of spectroradiometers; measurement errors.
Course materials and media: Will be announced at the beginning of the semester.
Teaching methods: Lecturers and project.The project is compulsory and counts 20% to the final result. The project can be experimental or theoretical, an oral presentation is given at the end to the class.
Learning outcomes: The course will be a first introduction to atmospheric physics, with emphasis on transmision of solar radiation and thermal balance, cloud formation and stratitification.

TFY4195 Optics
Credits: 7.5
Course responsibility: Professor Mikael Lindegren
Written examination: 4 hours
Recommended previous knowledge: TFY4160 or similar.
Course content: Wavetheory. Basics of polarization and geometrical optics. Matrix model to calculate imaging systems. Radiometry. Basics of coherence and interferometry, Fourier optics and diffraction. Holography and optical signal processing.
Course materials and media: Lectures and problem solving. Compulsory lab-work. The course will be given in English if students on the international master´s programme in Physics are attending the course.
Learning outcomes: The subject gives basic introduction to optics including physical optics with emphasis on imaging, Fourier optics and interferometry.

TFY4235 Numerical Physics
Credits: 7.5
Course responsibility: Professor Alex Hansen
Assessment: Approved assignment
Recommended previous knowledge: Basic knowledge of physics corresponding to TFY 4230 Statistical Physics.
Course content: Scalar, vector and parallel computers, linear algebra, finite difference methods, stochastic methods, ordinary differential equations, partial differential equations, optimization, linear programming, genetic algorithms, simulated annealing, Fourier methods, wavelet analysis, Monte Carlo methods, molecular dynamics, quantum mechanics, cellular automata.
Course materials and media: The course will be given in English if students on the international master´s programme in Physics are attending the course. Evaluation will be based on a final take home exam.
Learning outcomes: The goal of the course is to equip the students with a tool box of numerical methods in use or under development in computational physics.

FY3114 Functional Materials
Credits: 7.5
Course responsibility: Professor Emil J Samuelsen
Examination: Oral
Assessment: Approved assignment
Recommended previous knowledge: FY3112/TFY4220 Solid State Physics
Course content: Functional materials are materials that can be exploited either because of their intrinsic properties or added properties after treatment. Subjects: relation between properties and symmetry. Polymers. Electronic bands structures. Semiconductors: transistors; electronic memory. Organic semiconductors. Electric conduction: "free electrons"; electron correlation; metal oxides; semiconductor-to-metal transitions; low-dimensional conductors. Superconduction: classes of SC materials. Dielectrika; ferro- and piezo-electrika; frequency-dependent optical parameters; liquid crystals. Displays; optical memory. Magnetism: soft magnets; permanent magnets; magnetic memory. Magneto-resistance; spin-valve systems.
Course materials and media: R.E. Hummel: "Electronic Properties of Materials"; E.J. Samuelsen: "Structure and Properties of Materials".

TFY4265 Biophysical Micromethods
Credits: 7.5
Course responsibility: Professor Catharina de Lange Davies
Written examination: 4 hours
Recommended previous knowledge: Background in Molecular Biophysics equivalent of course TFY4310, Molecular Biophysics .
Course content: Mechanisms for molecular excitation and de-excitation. Interaction between light and biological specimens. Elements of geometrical, physical and Fourier optics. Light microscopy. Fluorescence microscopy. Confocal and multi-photn microscopy. CCD camera. Flow cytometry. Charge and volume determination of cells and microparticles. Near-field scanning microscopy. Scanning tunneling microscopy (STM) and atomic force microscopy (AFM). Contact and non-contact modes in AFM. Electron-specimen interactions. Electron-optics. Transmission (TEM), scanning (SEM) and scanning transmission (STEM) electron
microscopy. Amplitude and phase-contrast. Electron diffraction. Preparation of biological specimens for microscopy.
Course materials and media: Compendium.
Teaching methods: Lectures and laboratory exercises. The form of the examination may be changed from written to oral at the re-sit examination, if applicable. The course will be given in English if students enrolled in the international master´s programme in Physics are attending the course.
Learning outcomes: The course aims at giving an introduction in principles and methods for investigations og biological macromolecules, cells and various soft materials, by the use of various microscopy techniques.

MASTER OF SCIENCE IN MATHEMATICS

This International Master´s programme will not be taught in the academic year 2006/2007.

The Department of Mathematical Sciences offers a degree programme for two years (120 credits) for the Master of Science in Mathematics. However, new students will not be enrolled in the academic year 2006/2007 and a new description of the programme will thus be available later. There will probably not be significant changes from the programme for 2004/2005 which was as follows:

Outline of the programme
The Master of Science in Mathematics at NTNU is stipulated to take two years. One year of full studies corresponds to 60 credits, i.e. in total 120 credits are needed. The degree consists of two parts. The programme starts with course work corresponding to 82.5 credits and concludes with writing a thesis corresponding to 37.5 credits.

Aim and description of the course
The Department of Mathematical Sciences offers various courses at graduate level in addition to more specialized graduate seminars. Currently we offer three directions of study, algebra, analysis (functional analysis and complex and harmonic analysis, differential equations) and topology. All students must take at least 30 credits amongst the courses MA3201 Rings and modules, MA3202 Galois theory, TMA4145 Linear methods, TMA4225 Foundations of analysis, TMA4190 Manifolds and MA3402 Analysis on manifolds (unless the material has been covered in previous courses).

For the algebra direction, which builds upon MA3201 Rings and modules, MA3202 Galois theory, the courses MA3203 Ring theory and MA3204 Homological algebra should be taken. Some possible areas for topics for the thesis in algebra are presently representation theory of finite dimensional algebras, Lie-algebras, homological algebra and higher dimensional rings and orders.

For the analysis direction, which builds upon TMA4145 Linear methods, TMA4225 Foundations of analysis, the courses TMA4230 Functional analysis and TMA4175 Complex analysis should be taken. Some possible areas for topics for the thesis in analysis are presently geometric function theory, function spaces, harmonic analysis, continued fractions, dynamical systems, operator theory, topological measure theory and partial differential equations.

For the topology direction, which builds upon TMA4190 Manifolds, MA3402 Analysis on manifolds, the course MA3403 Algebraic topology should be taken, and at least one more topology course. Some possible areas for the thesis in topology are homotopy theory, K-theory, generalized cohomology theories, category theory, non-linear dynamics, Lie-groups and differential geometry.

As mentioned above, the coursework will take almost 1½ years (87.5 / 60 year). All the courses in the degree must be approved by the Department of Mathematical Sciences, NTNU.

Master´s Thesis
The thesis could contain some independent research, but could also be of purely expository nature. The student may be required to follow seminars on the topic of the thesis. These seminars will in addition to the courses help the student to obtain the necessary background needed for writing the thesis. The work with the thesis should correspond to a workload of 37.5 credits.

Examination
The examination in each of the courses is either a written examination or an oral examination normally at the end of the semester when the course is taught. However the examination in one course should be taken as a part of the final examination after the thesis has been handed in. This examination is oral. In connection with this examination the student can also be asked questions on the content of the thesis.

Grading
For all examinations and also for the thesis the scale of grading is from A (highest) to F (lowest) or F (fail).

EXAMINATION REGULATIONS AT THE NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

Adopted by the Board of NTNU on 7 December 2005 in accordance with the Act of 1 April 2005 relating to Universities and University Colleges, subsections 3-3, 3-4, 3-5, 3-9, 3-10 and 5-3. Revised by the Board on 24 January 2006.

Chapter 1 Scope, Purpose and Definitions

§ 1 Scope and Purpose

1. The regulations are valid for all studies at the Norwegian University of Science and Technology (NTNU).
2. The regulations contain rules about the organization of studies, examinations and assessment, requirements for the award of degrees, and regulations concerning the rights and obligations of the University and students at NTNU. The regulations are to ensure that studies and examinations at NTNU are carried out properly.

§ 2 Definitions

Final examination	A type of assessment that normally follows at the end of the semester under conditions that can be controlled. The final examination generally is the concluding assessment of the student in a course or a group of courses.
Course	The smallest unit in which the student can receive an assessment and course grade. The extent of the course is measured in credits. The course involves activities that form the basis for assessment. The activities may be compulsory.
Subject	A collection of courses in one group in a curriculum.
Main profile	Courses in a curriculum which are defined as belonging to the same discipline which can supplement each other and build on foundation course level in a programme of study. In case a Master's degree is based on a completed Bachelor's degree, the main profile contains the academic qualifications required for admission to the Master's degree.
Final grade	The grade given after a course or group of courses. It is based on the assessments that count during that course. The weighting of the grades in assessments during the course is stated in the course description.
Credits	Measure of the study workload. The normal workload in one academic year is 60 credits.
Programme of study	A group of courses that forms one academic entity that students can apply for admission to, receive the right to study, and leads to a degree.
Field of study	A specialization within a programme of study, which is described in the curriculum for that programme of study.
Assessment	The evaluations a student receives on the basis of his/her performance in a course, or a group of courses and that lead to a grade.
One-year programme	A structured group of courses totalling 60 credits and having separate admission.

These regulations refer to the Act relating to Universities and University Colleges of 1 April 2005, no. 15.

Chapter 2 Admission and individual education plan

§ 3 Admission

The valid admission regulations are the relevant regulations adopted by the Ministry of Education and Research and NTNU's own admission regulations.

§ 4 Admission to study and progress in studies

3. Admission involves the right to take the courses in the programme of study, a one-year programme or separate courses which the student has gained admission to. Admission provides the opportunity to take the courses specified in the individual education plan or in accordance with the progress in studies approved by the Faculty. Admission to study is valid from the day NTNU receives confirmation of the student's acceptance of his/her admission.
4. The right to take the programme of study which the student has been admitted to ceases when
   - the student fulfils the criteria allowing him/her to receive a certificate after completing the programme of study
   - the student has completed the one-year programme
   - the student's progress in studies is insufficient, according to the definition given in Section 4, subsection 3
   - the student himself/herself confirms that he/she has withdrawn from the programme of study before it is completed
   - the student has not paid the semester fee by the stipulated deadline, see Section 6.
5. In programmes of study that are divided into year courses/ years, a student cannot take the next year if he/she has an outstanding deficit of more than 22.5 credits from the two previous years. Students who want to take the 4th year cannot have any unfinished courses from the 1st year. Students who want to take the 5th year cannot have any unfinished courses from the 1st and 2nd years, and students who want to take the 6th year cannot have any unfinished courses from the 1st, 2nd, and 3rd years.
   The student loses the right to study a programme of study if he/she has an outstanding deficit of more than 22.5 credits. No student is permitted to use more than 2 academic years to take the same year in a programme of study. The time spent in each year should be adjusted according to any leave that has been granted, and any possible reductions in the study progress (part-time studies) that have been approved in the individual education plan, ref. Sections 5, 7, and 8.
   It is to be evident from the curriculum whether the programme of study is divided into years, ref. Section 14, subsection 1.
   Students that apply for re-admission to the same programme of study will, if applicable, be given recognition of previous studies in the year the student is admitted to. The same is true when there is great degree of similarity between a programme of study a student has applied for admission to and another programme of study a student has or had been admitted to. Exemption to this regulation can be made when more than three years have elapsed since the student was admitted to the other programme of study.
6. The Faculty is to decide whether the right to study should be terminated in accordance with the above regulations. The Faculty may grant exemptions from the regulations in Section 4, subsection 3 in cases of illness, serious family problems, when the main part of the studies has already been completed, extraordinary conditions related to the subject (taking the next year) or other reasons found to warrant special treatment. Where the Board of NTNU has established an inter-Faculty board for a group of programmes of study, the latter board is authorized to reach decisions in cases related to exemptions.
7. A student who is not covered the regulations in Section 4, subsection 3 has admission withdrawn if he/she has not earned any credits during one academic year in the programme of study or one-year programme that the student is admitted to. This does not apply if the student has registered for and been present at one or more examinations and when it is agreed in the individual education plan that the student is not to earn any credits. The Faculty is to decide in matters of withdrawal of admission.
8. A student who has gained admission to a programme of study and has had normal progress (without adjustment for leave or reduced progress in studies), is not to be affected by changes in the disciplinary objectives, level and structure of the programme while completing his/her work on the programme. The student nevertheless has to accept that there may be changes in the courses and the structure of the programme of study that will not cause a delay in his/her progress.
9. A student who has gained admission to a programme of study, one-year programme or individual courses at NTNU, has the right to follow other courses he/she is qualified to take and receive assessment of his/her performance in these courses. The student also has the right to follow lectures in courses outside the programme of study or one-year programme if there are no restrictions on the admission to the courses. The student maintains these rights also after having completed the programme of study.

§ 5 Individual education plan

The Faculty together with students who have gained admission to study for 60 credits or more are to agree on an individual education plan before the end of the first semester. The individual education plan can be amended in agreement with the Faculty. The individual education plan is a mutual agreement between the student and NTNU concerning the duties and responsibilities of each party for progress in studies as well as the duties and responsibilities of each student towards his/her fellow students. The individual education plan gives the content and progress of the planned studies, cf. Section 6, subsection 2.

§ 6 Registration

1. Students who have been admitted to NTNU have to register and pay the semester fee at NTNU each semester by the deadline set by the Rector. The deadline is given in the curriculum and on NTNU's Internet pages. Students who do not pay the semester fee by the stipulated deadline will have their admission withdrawn in accord-

ance with the regulations relating to Student Welfare Organizations of 12 February 2001, Section 10. The Faculty is to decide in matters of withdrawal of admission due to non-payment of the semester fee.
2. For students who have agreed to an individual education plan, this registration is to determine and confirm the information in the plan for the current semester concerning
   - which courses the student will attend
   - which courses the student is to be given assessment in
   - other possible activities determined in the programme of study which the student follows
   - other information where adjustments are possible and which is relevant for the student's progress in his/her studies.
3. Students who are not obliged to agree on an individual education plan or who have not yet entered into an individual education plan also have the duty to register. This registration is to indicate which courses the student will attend and receive assessment in.
4. The registration gives access to the resources offered by NTNU in order to enable the student to complete his/her courses that semester.

§ 7 Leave of absence
1. The Faculty is to handle applications for leave of absence. Such leave from study is primarily given for one academic year. For shorter periods, leave can be given until the end on the semester. A student must have completed more than 30 credits in the courses included in the programme of study in order to apply for leave of absence without stating a reason.
2. The Faculty may accept an application for leave for more than one academic year if there are special circumstances or pressing reasons, such as illness, extensive demands for child-care etc., military service or civilian service.
3. The student must accept that there may be changes in the programme of study during a period when he/she has a leave of absence.

§ 8 Part-time studies
Studies at NTNU may be taken on a part-time basis following agreement with the Faculty. The percentage of the nominal progress in studies is to be included in the individual education plan.

§ 9 Students without the right to study
1. Those who have not been granted admission have the right to receive assessment in a course in accordance with the Act relating to Universities and University Colleges, Section 3-10. The Faculty decides whether the requirements for registration have been fulfilled and may specify further regulations concerning assessment in the absence of normal admission.
2. The Rector may decide upon a special deadline for registration for this type of assessment. The Rector can also decide that those who have not been admitted as students should pay an examination fee in order to cover the extra cost of carrying out such assessments.

§ 10 Teaching – delegation of authority in accordance with the Act relating to Universities and University Colleges Section 3-8
1. The Faculty has the authority to reserve certain lectures just for the students of the University or specified groups of students if the nature of the lectures makes this necessary, cf. the Act relating to Universities and University Colleges Section 3-8, subsection 2.
2. The Faculty has the authority to allow people who are not following normal courses to attend lectures and participate in exercises whenever there is sufficient space.

§ 11 Suspension, exclusion – delegation of authority in accordance with the Act relating to Universities and University Colleges Section 4-8, subsection 1
1. In cases where a student behaves in a way that seriously disturbs the work of fellow students or the general activities of the University, the Faculty has the authority to give a written warning stating that if such behaviour is continued a recommendation concerning suspension will be presented to the Board. In cases that are not specifically related to an individual Faculty, this authority rests with the Rector.
2. The Faculty has the authority to give a written warning to a student that an exclusion recommendation will be presented to the Board unless the suspension decision made by the Board is respected. In cases that are not specifically related to an individual Faculty, this authority rests with the Rector.
3. Complaints about decisions involving a written warning should be sent to the Appeals Committee at NTNU.

Chapter 3 Organization of studies

§ 12 The academic year

1. The academic year consists of 40 weeks and is divided into two semesters. The autumn semester extends over 19 weeks and finishes before the end of the year. The spring semester lasts 21 weeks.
2. The Board of NTNU may approve that a programme of study at NTNU deviates from the ordinary structure described in Section12, subsection 1 if the duration of the programme is more than 40 weeks and has teaching and/or studies which can be pursued independently of the other studies at NTNU.

§ 13 Programme of study

1. Programmes of study at NTNU are organized according to the following models, they can
   - lead to a Bachelor's degree which subsequently forms the basis for a Master's degree.
   - be an integrated study which leads to a Master's degree or a professional degree
   - lead to a Master's degree which is based on a completed Bachelor's degree or equivalent education.

   The Board establishes and terminates each programme of study at NTNU. When the Board creates a new programme of study, it should simultaneously decide which Faculty is to administer the programme.
2. Each programme of study has a main profile, which gives disciplinary specialization of at least 80 credits. All programmes of study involving 5-year integrated Master's degrees should also satisfy the requirements of the Bachelor's degree.
3. Each programme of studies consists of different courses. The courses offered should each be of 7.5 credits or a multiple of that. The courses given in the programme of study are either compulsory or optional. The Faculty establishes new courses and terminates old ones. When the Board at NTNU has created an inter-Faculty board for a group of programmes of study, this authority is vested in this board. The Board at NTNU is to approve the establishment of courses where it is assumed that this will increase the basic disbursement in the State appropriation model.
4. All programmes of study leading to a lower degree as well as integrated programmes of study leading to a higher degree or a professional degree are to contain three introductory courses:
   - Ex. phil. of 7.5 credits that is to be common for all students. Ex. phil. should ideally be a first semester course but this is not compulsory if there are academic grounds to do otherwise.
   - Ex. fac. of 7.5 credits is specific for the relevant Faculty. It should be part of the main profile is and is to be taken in the first year.
   - Perspective course of 7.5 credits that is to represent a different field of study from that included in the student's programme of study.

§ 13a One-year programmes

The Rector is to establish and terminate each one-year programme at NTNU following a recommendation from the Education Committee. The rector is also to decide which Faculty is to administer each one-year programme.

§ 14 Curriculum and course description

Each programme of study is to be described in a curriculum. The Faculty administering the programme of study is to approve the curriculum. Where an inter-Faculty board has been established by NTNU to cover a group of programmes of study, this board is responsible for compiling the curriculum. The curriculum should contain information about possible admission requirements and ranking regulations for the programme of study. The curriculum should stipulate:

- the learning outcomes and professional objectives of the programme of study
- any required previous knowledge for the programme of study
- which Faculty is to administer the programme of study
- which courses are included in the programme of study
- the scope of the programme of study in terms of credits
- what course combination meets the required main profile
- the structure of the programme of study, whether the programme of study has been divided into years, the fields of study, which are the common courses, which are compulsory and optional courses, and the sequence of the courses
- the possibilities for student exchanges abroad
- other issues which affect the implementation and quality assurance
- transitional arrangements as a result of changes in the curriculum.

All courses are to be presented in a course description. Each Faculty is to provide a description of its own subject areas. Each course description should include:

- learning outcomes
- the qualifications necessary to gain admission to the course
- the content of the course

- teaching methods
- how many credits the course is worth
- the extent of the education
- possible compulsory education
- which activities are included, their extent and which of them are compulsory, for instance courses in methodology, exercises, work experience, field courses, excursions, laboratory work, group exercises, semester papers and other written exercises, artistic performances
- the requirements for receiving assessment
- activities that will be subject to on-going assessment and which of them will count in the course grade
- the organization of a possible final examination (how often, when in the semester, date and similar information)
- what examination support material can be used
- the form of assessment and grading scale for the assessments during the course
- the weighting of assessments during the course that are to count in the course grade

§ 15 Recognition of external studies/practical experience

1. The Faculty is to handle applications concerning recognition of external studies or practical experience in accordance with the Act relating to Universities and University Colleges Sections 3-4 and 3-5. A condition is that the external education has been approved as education at university or university college level.
2. The Faculty is to handle applications concerning the approval of an equivalent degree or education in accordance with the Act relating to Universities and University Colleges Section 3-4 subsection 3.

§ 16 Exemption from assessment

1. The Faculty is to grant exemption from the final examination, test or other assessment in cases where the student can document that similar assessment has already been done by NTNU or another institution. The Faculty may also grant exemption on basis of other recognized examinations, tests or other kinds of assessment, or on basis of documented practical experience, in accordance with the Act relating to Universities and University Colleges Section 3-5. When processing such applications for exemption, the Faculty should take both a student's previous education into account, as well as the assessment in terms of level, scope and content.
2. The student is to send such an application to the Faculty that administers the programme of study in which he/she has the right to study.

§ 17 Reduction of credits

If a student receives assessment in courses where the content wholly or partially overlaps, the total of credits for these courses should be reduced accordingly. The Faculty decides the extent of the reduction in each separate case. If some of the courses to which the student has gained admission to are compulsory, the reduction should take place in the optional courses. The reduction should be done in a way that provides the student with the best grade that has been awarded. The basis for the reduction should be evident from the transcript or certificate.

Chapter 4 Degrees

§ 18 Awarding degrees

The Faculties award degrees with their respective titles in accordance with their delegated responsibility from the Board when the latter approves a new programme of studies.

§ 19 Bachelor's degree

1. The Faculty awards the Bachelor's degree on basis of a completed programme of study or a free selection of courses in cases where the student has completed a total of 180 credits. The 180 credits should include:
   - a main profile of at least 80 credits, where the curriculum defines the requirements of the main profile
   - introductory courses of 22.5 credits, ref. Section 13 subsection 4.
2. If the Bachelor's degree is not based on an established programme of study, the Faculty that awards the degree is to cover the area where the major part of the disciplinary content belongs. If the student has a degree where more than one major parts are is included, the student can decide which of the relevant faculties should award the degree.

§ 20 Master's degree

1. In order to gain admission to a Master's programme which is based on a lower degree, the student must
   - have been awarded a Bachelor's degree or its equivalent
   - have received a passing degree in courses corresponding to 80 credits in the subject area of the relevant Master's degree, as specified in the curriculum for the relevant Master's programme
   - have fulfilled the other requirements for admission, as specified in the curriculum for the Master's programme.

   When admission to a Master's programme is based on experience, the second point is not valid. Instead, at

least 2 years of relevant professional experience is demanded.

2. In order to receive a Master's degree, the student must
   - either satisfy the admission criteria of the Master's programme and in addition have passes in relevant studies corresponding to 120 credits, where the curriculum allows 30 credits to be replaced by relevant practical experience
   - or have completed a course of studies corresponding to 300 credits, where the requirements of the Bachelor's degree are included.
3. In the Master's programme described in Section 20, subsection 2, a Master's thesis corresponding to at least 30 credits, but no more than 60 credits, should be included.
4. In order to receive a Master's degree corresponding to less than 90 credits, the specified requirements relevant for such a degree programme must have been met.

§ 21 Candidata/candidatus medicinae

In a programme of studies leading to the degree candidata/candidatus medicinae, introductory courses as defined in Section 13 subsection 4 are included. The degree is based on a coherent course of study corresponding to 360 credits. The Faculty of Medicine will decide the content of the programme of study as well as additional criteria for awarding the degree.

§ 22 Candidata/candidatus psychologiae

In a programme of studies leading to the degree candidata/candidatus psychologiae, introductory courses as defined in Section 13 subsection 4 are included. The degree is based on a study of 60 credits and a subsequent, coherent professional study corresponding to 300 credits. The Faculty of Social Sciences and Technology Management will decide the content of the programme of study as well as additional criteria for awarding the degree.

Chapter 5 Assessment

§ 23 Assessment

1. In all courses or groups of courses included in a programme of study, the possibility for assessment and subsequent grading of the knowledge and skills of the students should be available each academic year. The assessment should be given as a final evaluation, or possibly an evaluation based on different types of on-going assessments described in the curriculum.
2. In order to receive assessment, the student must have registered that same semester, and also meet the academic requirements for assessment given in the course description.
3. A student who has handed in a paper in an assessment cannot prevent the assessment from being done. The student cannot block an assessment if the examination began with an oral test.

§ 24 Examination periods

Final examinations take place at the end of each semester. The Rector decides the time of the examination periods. The dates are given in the curriculum. The Rector may decide to organize the examinations outside the regular examination periods, if practical considerations related to the courses or other things make this necessary.

§ 25 Final examination

The course description states whether the course is to be concluded with a final examination and what requirements the student has to satisfy in order to sit the final examination. A grade is always awarded at the final examination.

§ 26 Instructions at final examination

The Rector can issue general instructions for
- students who are allowed to sit a final examination
- invigilators
- the presence of teaching staff during a written final examination.

These instructions are found in the curriculum.

§ 27 Legitimate leave of absence at final examination

1. If a student is unable to sit a final examination due to illness or other pressing reasons, an application for approved absence has to be submitted to the Division of Student and Academic Affairs. The application, which has to be submitted at the latest one week after the first final examination to which the absence applies, has to contain information about which final examinations the application concerns. Documentation should be included in the application. The period of absence is to be indicated on the medical certificate.
2. A student who is taken ill during a final examination should notify the principal invigilator in the examination hall or the external examiner/internal examiner at oral examinations. The student subsequently has to see a doctor quickly and submit a medical certificate, as stated in the regulations in Section 27 subsection 1.

§ 28 Re-sit examination

1. In a course where the final examination is to be held only once in the academic year, a re-sit examination is to be arranged before the next normal examination. Students with an approved absence may take the re-sit examination. This also applies to students who have not passed the initial examination.
2. Students must register for the re-sit examination within the deadline stated by the Faculty or in the supplementary regulations.
3. The Faculty can in agreement with the Rector decide to organize the re-sit examination during the same period as the normal examination, in the next examination period or at a later time outside the examination period. For certain programmes of study, the time of the re-sit examination will be a standard arrangement that can be stated in the supplementary regulations.
4. During a re-sit examination, the quality of the assessment should correspond to the one given at the normal final examination. Alternative forms of assessment at re-sit examination should be stated in the course description.

§ 29 Approved absence from other types of assessment than final examination

The Faculty should, if practically possible, ensure that students with approved absence from other types of assessment than in the final examination can be assessed during the semester and before any possible final examination in the course.

§ 30 Re-examination

1. A student who has failed to pass the examination in a course has the right to repeat the examination and receive a new assessment. The course description or the supplementary regulations determine what areas have to be repeated after a student has failed to pass an examination.
2. The student has the right to complete a second period of practical work experience if he/she failed to pass the first period of practical work experience.
3. If the student has passed an examination, he/she has the right to repeat that examination once in one course every academic year in order to improve the grade. In this case, the best grade will count. In cases where the grade is based on a number of partial assessments, all the different components have to be repeated.

§ 31 New assessment of Master's thesis

A student may submit a new or revised Master's thesis once in cases where the thesis has not been awarded a passing grade. If the thesis has been given a passing grade, there is no opportunity for a new assessment in the same programme of study.

§ 32 Syllabus at new assessment/re-sit examinations

In case of new assessment and re-sit examinations, the syllabus of the course at the time of the new assessment or the re-sit examination is to be valid. In cases of changes in the national framework plans, the Ministry may decide upon special arrangements. If there are significant changes in the syllabus, there is to be a possibility to be assessed according to the former syllabus for at least one year, but no more than two years after the introduction of the changes.

§ 33 Adjusted forms of assessment

1. In order to give all students approximately the same working conditions when receiving assessment, students with particular requirements that have been sufficiently documented may apply for an adjusted form of assessment. Such an assessment does not imply any reduction in the general degree requirements.
2. The adjusted forms of assessment may be practically oriented in order to allow the use of special aids or extended time. In particular cases, types of assessment that differ from the normal one may also be accepted.
3. If the requirements of the student are permanent, the use of special aids may be allowed throughout his/her studies.
4. An application, including documentation, should be sent to the Division of Student and Academic Affairs before the registration deadline. The application is to be decided by the Rector. Applications for different forms of assessment from the one given in the course description are to be decided by the Rector in consultation with the Faculty.
5. Students with sudden acute requirements should as far as possible be given the same rights with regard to assessment as described above. An application containing sufficient documentation should be sent to the Division of Student and Academic Affairs as soon as possible after the acute situation has arisen.

§ 34 Form of language/language by written assessment

1. Arrangements with regard to the form of language used in examination papers are given in Regulations concerning forms of language in examination papers of 7 July 1987. The regulations are in accordance with the Act of 11 April 1980 no. 5 concerning the use of Forms of Language in the Public Services.
2. Examination papers written in Norwegian should contain a version in the other form of the Norwegian language (bokmål and nynorsk). The exception is examination papers in the subject Norwegian. In case all the students prefer the same form of language, the examination papers may only be written in this form. The students choose their form of language as they register for an examination.
3. If the lectures are given in a non-Scandinavian language, the examination paper should also include a version in the language that has been used in the lectures. Applications requesting the examination paper to be in a language different from Norwegian or that used in teaching are to be decided by the Faculty.
4. If a significant portion of the curriculum of the course is written in a language that is different from the one used in lectures, the Faculty may decide that the examination paper should contain a version in this language as well.

§ 35 Oral examinations behind closed doors

At the request of the student, the Faculty may decide against making an oral examination public in cases where there are pressing reasons, ref. the Act relating to Universities and University Colleges Section 3-9, subsection 3. The Faculty should ensure that the assessment in these cases also satisfies the normal academic level in the programme of study.

§ 36 Academic misconduct or an examination offence/attempted academic misconduct or an examination offence

1. In cases of academic misconduct or an examination offence/attempted academic misconduct or an examination offence, the University Appeals Committee may cancel the assessment in accordance with the Act relating to Universities and University Colleges Section 4-7. The same applies to the recognition of courses, credits or education, as well as exemption from assessment.
2. In accordance with the Act relating to Universities and University Colleges Section 4-8, subsection 3, the University Appeals Committee may expel a student who has behaved contrary to the regulations for up to one year. The student may also lose his/her right to sit for examinations within institutions affected by the ruling for up to one year.
3. More detailed information about reactions to academic misconduct or an examination offence is given in Guidelines for reactions to academic misconduct or examination offences/attempts at academic misconduct or examination offences at NTNU of 30 May 2001.

Chapter 6 Determination of grades

§ 37 Examiners

1. The Faculty appoints the examiners, ref. the Act relating to Universities and University Colleges Section 3-9, subsection 2. For inter-faculty courses such as “Experts in Team” that are not administered by one faculty, the rector is to appoint the external examiner(s). If there is an appeal, the Faculty is to appoint the external examiner(s). The examiners are appointed for 3 years at a time.
2. At least two examiners are to be present at oral examinations and assessment of vocational training or other activities of a type that cannot be subsequently checked. At least two examiners, of whom at least one should be external, should be present at the assessment of Master’s theses, ref. the Act relating to Universities and University Colleges Section 3-9, subsection 2.
3. The Faculty determines the guidelines regarding external participation at the assessment, whether general or a specific programme of study. This could be done by external participation in each separate assessment or through an external evaluation of the assessment procedures.

§ 38 Deadlines for determination of grades

In accordance with the Act relating to Universities and University Colleges Section 3-9, subsection 4, the deadline for determination of grades is 3 weeks following the examination, unless special reasons make it necessary to use more time. When special reasons occur, a new deadline should be announced. The deadline for assessment of the Master’s thesis is 3 months after the thesis has been handed in.

Chapter 7 Grades

§ 39 Grading scales
Assessment is given on basis of grading, either through a scale ranging from A to F or on the basis of Passed/Not Passed. Grade A is the highest pass grade, while Grade E is the lowest pass grade. The grading scale is based on the following descriptions and general qualitative descriptions:

Grade	Description	General, qualitative description of valuation criteria
A	Excellent	An excellent performance, clearly outstanding. The candidate demonstrates excellent judgement and a high degree of independent thinking.
B	Very good	A very good performance. The candidate demonstrates sound judgement and a very good degree of independent thinking.
C	Good	A good performance in most areas. The candidate demonstrates a reasonable degree of judgement and independent thinking in the most important areas.
D	Satisfactory	A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgement and independent thinking.
E	Sufficient	A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgement and independent thinking.
F	Fail	A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgement and independent thinking.

Passed/Not Passed is used where assessment is not required.

The Faculty is to provide descriptions of the assessment criteria that are specific for each subject.

§ 40 Grade Point Average
The Grade Point Average can be estimated as long as letter grades have been given for at least 75% of the credits. When estimating the Grade Point Average, all grades in each separate course should be included. The Grade Point Average is determined as follows:

1. Each letter grade is replaced by its equivalent number, A=5, B=4, C=3, D=2, E=1.
2. The numerical equivalent is multiplied by the number of credits in the course, and the separate sums of credits and numerical equivalents are added up for all courses that are included.
3. This total is subsequently divided by the total number of credits included in all the courses.
4. The quotient is calculated to one decimal place.
5. The Grade Point Average is the letter degree which represents the equivalent of the full number of the quotient after the normal rounding-up rule has been applied.

§ 41 Final grade
1. Whether or not a final grade is to be given is decided by supplementary regulations.
2. The final grade means the overall grade for the entire programme of study at the award of degree. The grade is a weighted average based on the letter grades in the courses included in the degree. In order to get a final grade the student must have a pass mark in courses at NTNU corresponding to at least 120 credits, and at least 75% of these must have been given a letter grade. The method for calculating the final grade is the same as that described for the Grade Point Average in Section 40.

§ 42 Explanations and appeals
1. Cases involving the explanation of grades and complaints about them are to be handled in accordance with the Act relating to Universities and University Colleges Section 5-3. Requests for an explanation of grades and complaints should be forwarded to the Faculty. If written guidelines for determining grades have been issued, these are to be made available for students after the grade has been decided, ref. the Act relating to Universities and University Colleges Section 5-3, subsection 3.
2. If there is a new assessment of a grade, at least two new examiners, including at least one external, are to be involved, ref. the Act relating to Universities and University Colleges Section 3-9, subsection 5. The new examiners should not have any information about the initial grade, the explanation for it or the basis of the student's complaint.

3. When on-going assessment is used, the student cannot lodge a complaint until he/she has received the grade in the relevant course or group of courses. Although the student cannot lodge a complaint following each separate assessment, he/she has the right to an explanation of the grading for each separate assessment.
4. Complaints against procedural errors can be submitted in accordance with the Act relating to Universities and University Colleges Section 5-2. The complaint is to be sent to the Faculty. In accordance with Section 5-2 of the Act relating to Universities and University Colleges, complaints can only be made about on-going assessments which will be included in the certificate or that count as part of the final grade.
5. Complaints about the grading of group work, where a common grade is given, all participating students must agree and sign the complaint. The same applies to complaints about procedural errors in these cases.

Chapter 8 Certificates and transcripts

§ 43 Certificates
1. Certificates are issued after the completion of a degree or an educational programme. A certificate is normally issued only once for the same degree/education. The certificate is to contain information about the programme of study the degree is based on. The certificate should show the semester and year the degree/educational programme was completed. The final grade (if applicable) is to be given on the certificate. Diploma supplements form a part of the certificate. A transcript of grades showing the courses the student has passed should be attached to the certificate.
2. In order to receive a certificate for a completed degree at NTNU, at least 60 credits have to been taken at NTNU. Of the 60 credits, at least 30 must belong to the main educational profile. With regard to a higher degree, the Master's thesis must be part of the 60 credits.

§ 44 Transcript
Upon request, students are to receive a transcript confirming their passing grades. The transcript should show the grades given in each course, the year and semester in which the grades were obtained, as well as the title and number of credits for the courses.

Chapter 9 Supplementary regulations and implementation

§ 45 Supplementary regulations
The Faculty has the authority to add supplementary regulations to these regulations. With inter-Faculty programmes of study, the supplementary regulations are to be accepted by all faculties involved. When an inter-Faculty board has been established by the Board of NTNU for a group of programmes of study, the supplementary regulations should be decided by the inter-Faculty board.

§ 46 Implementation
These regulations are to come into force immediately.

EXTRACTS FROM ACT OF 1 APRIL 2005 RELATING TO UNIVERSITIES AND UNIVERSITY COLLEGES

Chapter 3 Academic decisions - accreditation

§ 3-9. Examinations and marking

1. Universities and university colleges shall ensure that students' knowledge and skills are tested and assessed in a manner that is impartial and academically sound. Assessment shall also safeguard the academic standards of the course of study in question. An external evaluation shall be made of the assessment or assessment arrangements.
2. The board shall appoint examiners for examinations, tests, assessments of assignments or other assessments the results of which are entered on the diploma or included in the mark given for the course of study in question. When assessing candidates' independent work in higher degree courses, each candidate shall be assessed by at least two examiners, of whom at least one shall be external.
3. The oral parts of examinations and tests shall be public unless regard for the examination or test arrangements indicates otherwise. The board may make exceptions to the rule concerning public examinations in particular cases at the request of the examination candidate concerned when particularly weighty reasons so indicate.
4. Marks shall be made known within three weeks unless for special reasons more time is required. The board may itself make exceptions in respect of specific examinations and may in temporary regulations pursuant to the seventh paragraph set a longer time limit when it is not possible to provide the number of qualified examiners required to complete the marking within three weeks. The board may itself in a regulation pursuant to the seventh paragraph set a longer time limit for dissertations and similar large written works.
5. Re-marking pursuant to sections 5-2 and 5-3 shall be carried out by at least two new examiners, of whom at least one shall be external. Marks may be changed in the appellant's favour and disfavour. If the final mark is set on the basis of both a written and an oral test and an appeal against a mark for the written part of the examination is upheld, a new oral test shall be held to determine the final mark.
6. The mark awarded following an examination, test, assessment of an assignment or other assessment shall either be pass/fail or be based on a graded scale of six marks from A to F, where A to E indicate a pass and F indicates a fail.
7. The board itself issues regulations governing the taking and arrangement of examinations and tests, including the conditions for resitting an examination or test and for permission to retake a practice period, and provisions concerning registration and the conditions for registration for examinations. In the case of courses for which national curriculum regulations have been established pursuant to section 3-2, second paragraph, the regulations must be based on any general provisions concerning examinations and assessment contained in the curriculum regulations. The board may delegate the issue of supplementary provisions concerning special circumstances relating to particular examinations to a faculty or department.

Chapter 4 The students' rights and obligations

§ 4-7. Annulment of examinations or tests

1. The board itself or the board's appeals committee, cf. section 5-1, may annul an examination or test or recognition of a course if the student
   a) by using a false diploma or by other dishonest means, has gained admission to the examination or test or to attend the course concerned, or
   b) has attempted to cheat or wilfully or through gross negligence has cheated in the course of or prior to the final assessment of the examination or test concerned, or while taking the course in question.
2. The board itself or the institution's appeals committee, cf. section 5-1, may annul credit for or recognition of a course or exemption from an examination or test if the student obtained it by using a false diploma or by other dishonest means.
3. Annulment decisions pursuant to the first and second paragraph may be appealed to the Ministry or to a special appeals body appointed by the Ministry, cf. section 5-1, seventh paragraph.
4. The right to annulment has no time limit.
5. An annulment decision entails an obligation to return any diplomas or mark transcripts to the institution. If such diploma or mark transcript is not returned to the institution at the proper time, the institution may obtain the assistance of an enforcement officer (namsmann) to secure its return, pursuant to the provisions laid down in Chapter 13 of the Enforcement Act.
6. If the diploma can form the basis of authorization for the exercise of a profession or trade, the institution shall notify the authority concerned of the annulment.

7. Other institutions under the present Act may be informed of the annulment of an examination or test. The Ministry issues specific provisions concerning information routines, etc.

§ 4-8. Exclusion

1. A student who despite written warning by the board repeatedly behaves in a manner which seriously disturbs the work of fellow students or other activities at the institution may be excluded by the board itself or the institution's appeals committee, cf. section 5-1, from specific parts of the institution for up to one year. If a student after receiving a written warning from the board continues not to respect such exclusion, the board itself or the institution's appeals committee, cf. section 5-1, may exclude him or her from attending courses for up to one year.
2. A student who has behaved in such a seriously censurable manner as to endanger the life or health of patients, clients, children attending a day care institution, pupils or others with whom the student comes into contact in connection with clinical or practical training or who in relation to such persons commits serious breaches of the obligation to observe secrecy or behaves with gross indecency, may, if the board itself or the institution's appeals committee, cf. section 5-1, so decides, be excluded from attending courses for up to three years. The institution shall inform the Norwegian Directorate for Health and Social Welfare of any exclusion pursuant to this provision of students attending courses that may result in a right of authorization pursuant to section 48, first paragraph, of the Health Personnel Act.
3. A student who has behaved as described in section 4-7, first or second paragraph, if the board itself or the institution's appeals committee so decides, cf. section 5-1, may be excluded from the institution and deprived of the right to sit examinations at institutions under this Act for up to one year. The Ministry issues specific provisions concerning information routines, etc.
4. A decision to exclude a student requires a majority of at least two-thirds. The student may appeal against such a decision pursuant to the provisions laid down in the Public Administration Act. The Ministry or a special appeals body appointed by the Ministry is the appeals body.
5. The student is entitled to seek the assistance of a lawyer or other spokesman from the date the question of exclusion is raised or from the date of any written warning pursuant to the first paragraph. The cost of such assistance shall be met by the institution.

Chapter 5 Appeals

§ 5-2. Complaints against procedural errors in connection with examinations

1. A candidate who has taken an examination or test may complain of procedural errors within three weeks of the date when he or she became or should have become aware of the circumstance on which the complaint is based. Such complaints are ruled on by the board itself or the institution's appeals committee. 1 April 2005
2. If an error was committed which may have affected the student's performance or its assessment, the mark shall be rescinded. If the error can be corrected by remarking the papers submitted, they shall be re-marked. Otherwise a new examination or test shall be held with new examiners. The mark awarded in a second assessment pursuant to the present section may be appealed against pursuant to the provisions laid down in section 5-3.
3. If a request for explanation of or an appeal against a mark has been submitted, the time limit for an appeal pursuant to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on.
4. If the board or the board's appeals committee finds that formal errors were committed and that this can reasonably be supposed to have affected the performance of one or more candidates or the assessment of that performance, the decision may be taken to carry out a new assessment or to hold a new examination or test.

§ 5-3. Complaints regarding marks awarded - right to explanation

1. A student is entitled to an explanation of the marks awarded for his or her performance. At oral examinations or assessments of practical skills, a request for such an explanation must be made immediately on notification of the mark. Requests for explanations of other assessments must be submitted within one week after the candidate learns of the mark, but never more than three weeks after the announcement of the mark.
2. Explanations shall normally be given within two weeks after the candidate requests them. They shall state the general principles on which the assessment was based and explain the assessment of the candidate's performance. Explanations may be given orally or in writing at the examiner's discretion.
3. If written guidelines for assessments have been issued, they shall be available to students after the marks have been decided.
4. A student may appeal in writing against a mark awarded for his or her performance within three weeks of the announcement of the examination results. The performance shall then be reassessed. In the event of a request for an explanation of a mark or a complaint of procedural errors in the question-setting, the examination procedure or the assessment procedure, the time limit for appeals pursuant to this section is reckoned from the date when the student receives the explanation or when the appeal is finally ruled on. In connection with the use of

continuous assessment, the institution may decide whether the student shall submit an appeal following the assessment of a separate examination, assignment or other assessment or whether an appeal shall be submitted on announcement of the result of assessment of the study programme, discipline, or module.

5. Appeals may not be lodged against marks awarded for oral performance and assessment of practical training or the like which, owing to the nature of the test cannot be reviewed. The results of preliminary examinations (forprøver) may only be appealed against when the examination is failed.
6. Marks awarded following re-marking pursuant to this section may not be appealed against.