NTNU

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

INTERNATIONAL MASTER´S PROGRAMMES
2005 - 2006

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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 2005/2006.

Good luck with your studies,

Student and Academic Division
Office of International Relations

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, **Course code** for the autumn examination and v for the spring examination.

Course code
The course code comprises 6 or 7 digits.

Course title
This box gives the course title in abbreviated 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 titles in the course catalogue show:
Abbreviated course title (English)
Complete course title (English)Course responsibility

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
This provides information about when and where teaching will be given during the academic year.

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 teknologi 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

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

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	Specialization 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	TBA4310	TRANSPORT TECHNOLOGY					3	3	6	7,5	x	v	v	v	v	v
1v	AAR4230	PLAN IN DEV COUNTRY	3,4				3	1	8	7,5	x	v	v	v	-	v
		Total weighting compulsory course								37,5						
2h	TBA5700	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
		Total weighting compulsory course								22,5/ 30,0						
2v		Master Thesis	8							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 TBA5700. 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

MSC-PROGRAMME IN EARTH SCIENCES AND PETROLEUM ENGINEERING

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	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	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	WELL TECHNOLOGY					3	2	7	7,5	x	o	o	o	o
1v	TPG5110	PETROLEUM ECONOMICS					3	2	7	7,5	x	v	v	v	v
		Total weighting compulsory subjects	3							30,0/ 37,5					
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
		Total weighting compulsory subjects	4							22,5					
2v		Master Thesis								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) The course is not taught in 2005/06.
3) 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.
4) One subject must be chosen in the third semeser (2h). In addition to the subject 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 Technology
4 Formation Evaluation

MSC-PROGRAMME IN EARTH SCIENCES AND PETROLEUM ENGINEERING

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	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	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
		Total weighting compulsory subjects	2							15,0	
2h	TGB4715	PETR GEOLOGY SPEC				36				22,5	x
2h	TPG4120	ENG/ENVIRONM GEOPHYS		2	2	8				7,5	x
2h	TPG4190	SEISMIC DATA		3	2	7				7,5	x
2h	TPG4720	PETR GEOSCIENCE SPEC				36				22,5	x
2h	TPG5200	PET ENG/GEO INT PROJ			5	7				7,5	-
		Total weighting compulsory subjects	3							30,0/ 22,5	
2v		Master Thesis								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) 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 taught in English.
   Specialization and compulsory subjects within these:
   Seismics: TGB4160 Petroleum Geology (1h), TPG4130 Seismic Interpretation (1v), TPG4170 Reservoir Seismics (1v) and TPG4190 Seismic Data (2h).
   Reservoir Geology: TPG4180 Petrophysics, Interpretation of Well Data AC (1v), TGB4160 Petroleum Geology (1h), TGB4170 Diagenesis/Res.Qual. (1v) and TPG4190 Seismic Data (2h).
   Formation Evaluation: TPG4180 Petrophysics, Interpretation of Well Data AC (1v), TPG4130 Seismic Interpretation (1v) and TPG4185 Formation Mechanics (1h).

MSC-PROGRAMME IN GEOTECHNICS AND GEOHAZARDS
(MSGEOTECH)

Term 1 and 2 (Autumn 2005 and Spring 2006)
Term 3 and 4 (Autumn 2006 and Spring 2007)

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
		Total weighting		13	12	23	13	10	25	60,0	
2h	TBA4700	GEOTECH ENG SPEC				36				22,5	x
2h	TGB5100	ROCK ENGINEERING AC		3	2	7				7,5	x
		Total weighting		3	2	43				30,0	
2v		Master Thesis	1							30,0	

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

1) The Master's Thesis is to be submitted in term 4 (spring term).

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	PLAN/DESIGN DAMS 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	TVM5130	HYDROPOWER PROJECT						12	12	15	-
1v	TVM5140	ENVIRONM/ECONOMI BC					4	4	4	7,5	x
1v	TVM5145	GEOLOGY/TUNNELL BC					4	4	4	7,5	x
		Total weighting			48			48		60	
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
		Total weighting			48					30	
2v		Master Thesis	1							30	

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 Master Thesis is to be submitted in term 4 (spring term).

MSC-PROGRAMME IN INDUSTRIAL ECOLOGY (MSINDECOL)

Term 1 and 2 (Autumn 2005 and Spring 2006)
Term 2 and 3 (Autumn 2006 and Spring 2007)

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
1h	TEP4223	LCA/ECO-EFFICIENCY		4	1	7				7,5	x	o	o	o
1h	TVM4162	INDUSTRIAL ECOLOGY		3	2	7				7,5	x	o	o	o
1h	SOS3050	EMP RESEARCH METHODS	1	2	4	6				7,5	x	o	o	o
1h	-	OPTIONAL COURSES	2							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	TIØ4291	IND ENV POLICY/MANAG					2	3	7	7,5	x	v	v	o
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	2							7,5				
		Total weighting compulsory courses										45,0	45,0	45,0
2h	TEP4222	IN-OUTPUT TRADE/ENV		4		8				7,5	x	o	v	v
2h	TPK4160	VALUE CHAIN CONTR		2	3	7				7,5	x	v	o	v
2h	-	OPTIONAL COURSES	2							7,5/ 15,0	x	v	v	v
2h	-	Project and thesis preparation course	3							15,0	-	o	o	o
		Total weighting compulsory courses										22,5	22,5	15,0
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) SOS3050 is interchangeable with SOS1002. Students who have already completed SOS1002 or equivalent must choose another course from the list of Industrial Ecology courses or from the list of Master and PhD level courses and modules. The combination of courses must be approved by the programme.
2) According to their disciplinary background, students choose from both the list of Industrial Ecology courses and from the list of Maser 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).
3) 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.

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

MSC-PROGRAMME IN INFORMATION SYSTEMS
(MSINFOSYST)

Term 1 and 2 (Autumn 2005 and Spring 2006)
Term 3 and 4 (Autumn 2006 and Spring 2007)

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
		Total weighting compulsory courses		6	6	36	3	7	14	45,0		
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
		Total weighting compulsory courses		2	2	32				22,5		
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) Two optional courses must be chosen.
2) One optinal course must be chosen.

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	TMT4220	MECH PROP ENG MATR 1		4	1	7				7,5	x
1h	MT8301	CARBON MAT TECHN		2	2	8				7,5	x
1v	-	EXP IN TEAM INT PROJ						5	7	7,5	-
1v	TMT4150	REFRACTORIES					4	2	6	7,5	x
1v	TMT4160	HIGH TEMP CHEM PROJ					2	4	6	7,5	-
1v	TMT4235	REFIN/RECYCL METALS					3	2	7	7,5	x
		Total weighting		14	7	27	9	13	26	60,0	
2h	TMT4295	ELECTROLYTIC PROCESS		3	2	7				7,5	x
2h	TMT5730	PROC MET/ELECTR SPEC		2	26	8				22,5	x
		Total weighting		5	28	15				30,0	
2v		Master Thesis								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 (MSN1)

Term 1 (May-July 2005)*
Term 2 and 3 (Autumn 2005 and Spring 2006)*
Term 4 (Autumn 2006 to February 2007)

MARINE STRUCTURES

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
		Compulsory subjects:									
1a	TMR5140	MARINE STRUCT BC		3	6	3				7,5	x
1a	TMR5150	MARINE DYNAMICS BC		3	6	3				7,5	x
1a	TMR5190	MARINE HYDRODYN BC		4	6	2				7,5	x
		Weighting compulsory courses		10	18	8				22,5	
		Compulsory subjects:									
2h	TMR4190	ELEM METHODS STRUCT		3	6	3				7,5	x
2h	TMR4215	SEA LOADS		3	6	3				7,5	x
2h	TPG5100	MATH/COMPUTER METHOD	1	2	8	2				7,5	-
		Weighting compulsory courses		8	20	8				22,5	
		Optional subjects:									
2h	TMR4200	FATIGUE/FRACTURE	2	3	6	3				7,5	x
2h	TMR4235	STOCH THEORY SEALOAD	2	3	6	3				7,5	x
2v	TMR4195	DESIGN OFFSHOR STRUC	3				3	6	3	7,5	x
2v	TMR4205	BUCKLING/COLLAPS STR	3				3	6	3	7,5	x
2v	TMR4217	HYDRO HIGH-SPEED VEH	3				3	6	3	7,5	x
2v	TMR4220	NAVAL HYDRODYNAMICS	3				3	6	3	7,5	x
2v	TMR4225	MARINE OPERATIONS	3				3	6	3	7,5	x
2v	TMR4230	OCEANOGRAPHY	3				3	6	3	7,5	x
2v	TMR5160	MARIN STRUCT PROJECT	4					12		7,5	-
2v	TMR5200	MARINE HYDRO PROJECT	4					12		7,5	-
3h	TMR5170	MAR STRUC SPEC SUBJ	5	4	4	4				7,5	x
3h	TMR5220	MAR HYDRO SPEC SUBJ	5	4	4	4				7,5	x
3h		Master Thesis								30,0	

Ex 1a = Term 1, Exam August
Ex 2h = Term 2, Exam Autumn
Ex 2v = Term 3, Exam Spring
Ex 3h = Term 4, Exam Autumn, the Master Thesis is to be submitted in February 2007.

*) MSC-PROGRAMME IN MARINE TECHNOLOGY are offered every second year. Next time starting in May 2007, with preliminary application deadline 1. December 2006 (www.marin.ntnu.no/msc). E-mail for information: mscadm@ivt.ntnu.no. The programme may be subject to change.

1) Exercises with examples from marine technology topics.
2) Select 1 of the subjects.
3) Select 3 of the subjects.
4) Select 1 of the subjects.
5) Select 1 of the subjects, so that the total weighting of the programme contains 120 credits (Cr.).

MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1 (May-July 2005)*
Term 2 and 3 (Autumn 2005 and Spring 2006)*
Term 4 (Autumn 2006 to February 2007)

MARINE SYSTEMS ENGINEERING

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
		Compulsory subjects:									
1a	TMR5100	MAR DESIG/MAR ENG BC		4	6	2				7,5	x
1a	TMR5190	MARINE HYDRODYN BC		4	6	2				7,5	x
1a	TMR5270	OPERATION TECHN BC		3	6	3				7,5	x
		Weighting compulsory courses		11	18	7				22,5	
		Compulsory subjects:									
2h	TMR4115	DESIGN METHODS		3	6	3				7,5	x
2h	TMR4290	DIESEL-EL PROP SYST		3	6	3				7,5	x
2h	TMR5120	DESIGN MAR VEHICLES			12					7,5	-
2v	TMR4130	RISK ANALYSIS SAFETY					2	8	2	7,5	-
2v	TMR4280	INTERNAL COMB ENGINE					3	6	3	7,5	x
		Weighting compulsory courses		6	24	6	5	14	5	37,5	
		Optional subjects:									
2h	TMR4275	MOD/SIM/AN DYN SYST	2	3	6	3				7,5	x
2h	TPG5100	MATH/COMPUTER METHOD	1,2	2	8	2				7,5	-
2v	TMR4125	BUILD SHIPS/PLATFORM	3				3	3	6	7,5	x
2v	TMR4220	NAVAL HYDRODYNAMICS	3				3	6	3	7,5	x
2v	TMR5110	MAR DESIGN PROJECT	4					12		7,5	-
2v	TMR5280	MAR ENGINEER PROJECT	4					12		7,5	-
2v	TMR5290	TECH OPERAT PROJECT	4					12		7,5	-
3h	TMR5130	MAR DESIGN SPEC SUBJ	5	4	4	4				7,5	x
3h	TMR5300	MAR ENG SPEC SUBJ	5	4	4	4				7,5	x
3h	TMR5310	TECH OP SPEC SUBJ	5	4	4	4				7,5	x
3h		Master Thesis								30,0	

Ex 1a = Term 1, Exam August
Ex 2h = Term 2, Exam Autumn
Ex 2v = Term 3, Exam Spring
Ex 3h = Term 4, Exam Autumn, the Master Thesis is to be submitted in February 2007.

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1) Exercises with examples from marine technology topics.
2) Select 1 of the subjects.
3) Select 1 of the subjects.
4) Select 1 of the subjects.
5) Select 1 of the subjects, so that the total weighting of the programme contains 120 credits (Cr.).

MSC-PROGRAMME IN MARINE TECHNOLOGY (MSN1)

Term 1 (May-July 2005)*
Term 2 and 3 (Autumn 2005 and Spring 2006)*
Term 4 (Autumn 2006 to February 2007)

MARINE CONTROL SYSTEMS

Ex	Subject no.	Subject title	Note	Autumn F	Autumn Ø	Autumn S	Spring F	Spring Ø	Spring S	Cr	Exam
		Compulsory subjects:									
1a	TMR5140	MARINE STRUCT BC	1	3	6	3				7,5	x
1a	TMR5150	MARINE DYNAMICS BC		3	6	3				7,5	x
1a	TMR5190	MARINE HYDRODYN BC		4	6	2				7,5	x
		Weighting compulsory courses		10	18	8				22,5	
		Compulsory subjects:									
2h	TMR4215	SEA LOADS		3	6	3				7,5	x
2h	TMR5180	CONTROL ENGINEERING		3	6	3				7,5	x
2v	TMR4240	MARINE CONTROL SYST					3	6	3	7,5	x
2v	TTK4130	MODELLING/SIMULATION					4	4	4	7,5	x
2v	TTK4190	GUIDANCE AND CONTROL					3	2	7	7,5	x
		Weighting compulsory courses		6	12	6	10	12	14	37,5	
		Optional subjects:									
2h	TMR4190	ELEM METHODS STRUCT	2	3	6	3				7,5	x
2h	TMR4275	MOD/SIM/AN DYN SYST	2	3	6	3				7,5	x
2h	TTK4150	NONLINEAR CONTR SYST	2	3	2	7				7,5	x
2h	TTT4140	FUND OF NAVIGATION	2	4	2	6				7,5	x
2v	TMR4220	NAVAL HYDRODYNAMICS	3				3	6	3	7,5	x
2v	TMR4225	MARINE OPERATIONS	3				3	6	3	7,5	x
2v	TMR4230	OCEANOGRAPHY	3				3	6	3	7,5	x
2v	TTT4150	NAVIGATION SYSTEMS	3				4	2	6	7,5	x
3h	TMR5210	CONTR SYST SPEC SUBJ	4	4	4	4				7,5	x
3h		Master Thesis								30,0	

Ex 1a = Term 1, Exam August
Ex 2h = Term 2, Exam Autumn
Ex 2v = Term 3, Exam Spring
Ex 3h = Term 4, Exam Autumn, the Master Thesis is to be submitted in February 2007.

*) MSC-PROGRAMME IN MARINE TECHNOLOGY are offered every second year. Next time starting in May 2007, with preliminary application deadline 1. December 2006 (www.marin.ntnu.no/msc). E-mail for information: mscadm@ivt.ntnu.no. The programme may be subject to change.

1) Can be replaced by the subject Calculus 4.
2) Select 2 of the subjects.
3) Select 1 of the subjects.
4) Select 1 subject, so that the total weighting of the programme contains 120 credits (Cr.).

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 subjects:									
1h	TMA5100	CALCULUS 4		4	2	6				7,5	x
1h	TMR4215	SEA LOADS		3	6	3				7,5	x
1h	TMR5190	MARINE HYDRODYN BC		4	6	2				7,5	x
1h	TTT4140	FUND OF NAVIGATION		4	2	6				7,5	x
1v	TMR5150	MARINE DYNAMICS BC					3	6	3	7,5	x
1v	TMR5230	NAUTICAL SCIENCE BC					3	6	3	7,5	x
1v	TTT4150	NAVIGATION SYSTEMS					4	2	6	7,5	x
		Weighting compulsory courses		15	16	17	10	14	12	52,5	
		Optional subjects:									
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 subjects:									
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
		Weighting compulsory courses		5	26	5				22,5	
		Optional subjects:									
2h	TMR4235	STOCH THEORY SEALOAD	2	3	6	3				7,5	x
2h	TMR5180	CONTROL ENGINEERING	2	3	6	3				7,5	x
2v		Master Thesis								30,0	

Ex 1h = Term 1, Exam Autumn 2005
Ex 1v = Term 2, Exam Spring 2006
Ex 2h = Term 3, Exam Autumn 2006
Ex 2v = Term 4, The Master Thesis Spring 2007.

*) MSC-PROGRAMME IN MARINE TECHNOLOGY - NAUTICAL SCIENCE, is offered every second year. Next time starting in August 2007, with preliminary application deadline 1. December 2006 (www.marin.ntnu.no/msc). E-mail for information: mscadm@ivt.ntnu.no. The programme may be subject to change.

1) Select 1 of the subjects..
2) Select 1 of the subjects.

MSC-PROGRAMME IN PROJECT MANAGEMENT
(MSPROMAN)

Term 1 and 2 (Autumn 2005 and Spring 2006)
Term 3 and 4 (Autumn 2006 and Spring 2007)

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	PROJECT 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	TIØ5150	INFO/COMMUNICATION					2	2	8	7,5	x	o
1v	TIØ5210	PROJECT MANAGEMENT 5					3	2	7	7,5	x	o
1v	TIØ5215	PROJECT MANAGEMENT 6	1				3	2	7	7,5	x	v
		Total weighting compulsory courses								52,5		
2h	-	Specialization including project work								22,5	x	o
2h	-	Optional course								7,5		v
		Total weighting compulsory courses								22,5		
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 Theses Spring

1) Students can apply for another course.

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

Term 1 and 2 (Autumn 2005 and Spring 2006)
Term 2 and 3 (Autumn 2006 and Spring 2007)

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		2	2	8				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	2				4	1	7	7,5	x	v
1v	TMA4255	DESIGN EXP/STAT MET	2				4	1	7	7,5	x	v
1v	TMA4275	LIFETIME ANALYSIS	1				4	1	7	7,5	x	v
1v	TMR4130	RISK/SAFE MAR TRANSP	1				2	8	2	7,5	-	v
1v	TPK5165	RAMS ENG/MANAGEMENT					3	2	7	7,5	x	o
		Total weighting compulsory courses		11	8	29	3	7	14	45,0		
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
		Total weighting compulsory courses		5	5	38				30,0		
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 2 of the courses, so that the total weighting of the programme contains 120 credits (Cr).

COURSES DESCRIPTIONS OF THE MASTER OF SCIENCE DEGREES IN ENGINEERING

Department of Civil and Transport Engineering

TBA4100 Geotechnical Engineering and Engineering Geology

Lecturer: Professor Bjørge Brattli, Førsteamanuensis Rolf Birger Sandven
Coordinator: Førsteamanuensis Rolf Birger Sandven
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 shall give a broad introduction to geotechnical engineering and geology. The subject shall also give an introduction to the formation, properties and behaviour of soils and rocks.
Recommended previous knowledge: No prerequisite.
Academic content: Description of soils and rocks for engineering purposes, formation of deposits, minerals and rocks, quartenary geology, engineering geology, stresses and stress changes in soils, estimates of bearing capacity, earth pressure and slope stability by simple equilibrim evaluations. Strains in soils (settlements).
Teaching methods and activities: Lectures, assignments with assistance and presentation of solutions. Laboratory work and demonstrations. Assignments must be accepted to give admittance to exam. The assignments contributes with approximately 1/ 3 of the final mark. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Emdal: Geoteknikk 1, handouts. Tarbuck and Lutgens: Earth. An introduction to Physical Geology (textbook).
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	09.06.2006	09.00	67/100	D
EXCERCISES			33/100	

TBA4115 Finite Elements in Geotechnical Engineering

Lecturer: Professor Corneliu Athanasiu, Amanuensis Arnfinn Emdal
Coordinator: Amanuensis Arnfinn Emdal
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 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 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.
Course materials: Lecture notes from Geotechnical Division, NTNU.
Assessment: Oral/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.06.2006	15.00	67/100	C
EXCERCISES			33/100	

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. 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	23.05.2006	09.00	100/100	C

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

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. 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	09.12.2005	15.00	100/100	C

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

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. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Compendium, selected papers.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	27.05.2006	09.00	100/100	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: None

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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2006	09.00	100/100	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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2005	09.00	70/100	C
EXCERCISES			30/100	

TBA4310 Transport Technology

Lecturer: Førsteamanuensis Eirin Olaussen Ryeng
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: Give an introduction to the transport modes, their physical characteristics and technology related to various cargo units and standards, intermodal transports and terminals.
Recommended previous knowledge: None.
Academic content: The subject takes a technological approach, detailing the physical characteristics for the transportation modes and the terminals. Relationship between technical production solutions and transport technology is covered. Unit loads, intermodal solutions and the function and structure of the terminals are central issuses. In addition are included subjects related to physical distribution, transport informatics, dangerous cargo and risk assessments. Introduction to the theoretical basis for cargo transport models will be given, as will be data- and development demands for these.
Teaching methods and activities: Lectures, group works, seminars and excercises.
The subject is taught in English. There will not be given organised lectures when five or less students are taking the course.
Course materials: Lecture notes.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	07.06.2006	09.00	100/100	D

TBA4700 Geotechnical Engineering, Specialization

Lecturer: Professor 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	50/100	D
EXCERCISES			50/100	

TBA5100 Theoretical Soil Mechanics

Lecturer: Amanuensis Arnfinn Emdal
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 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	17.12.2005	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: Exercises

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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	09.12.2005	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	26.05.2006	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

Learning objectives: To understand the project context, the constraints regarding to health and safety, and 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	30.11.2005	09.00	50/100	A
EXCERCISES			50/100	

TBA5700 Coastal and Marine Civil Engineering, Spesialization

Lecturer: 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 specialization will give the student an in-depth theoretical knowledge and competence within a selected subject area of the field. It will improve the student ability to do independent engineering/research work, and provide training in planning of projects, systematic processing of information and report writing.
Recommended previous knowledge: Exams in the required basic courses necessary for the chosen specialization subjects.
Academic content: The specialization in Coastal and Marine Civil Engineering is divided into 5 subject areas: Coastal Engineering, Port Engineering, Marine Civil Engineering, Arctic Offshore Engineering and Marine Geotechnics. The specialization consists of a project work equivalent to 11,25 Cr and normally three selected specialization subjects listed below summing up to 11,25 Cr. For each subject area one of the specialization subjects is compulsory. The specialization subjects are:
Coastal Engineering II (3,75Cr, compulsory for Coastal Engineering, (Professor Øivind A. Arntsen)
Port Engineering (3,75Cr, compulsory for Port Engineering, (Professor Eivind Bratteland)
Flow-Induced Vibrations (3,75Cr, compulsory for Marine Civil Engineering, (Professor Geir Moe)
Marine Geotechnics (3,75Cr, compulsory for Marine Geotechnics, (Professor Lars Grande)
Safety and Reliability (3,75Cr, (Professor Arvid Næss)
For Arctic offshore engineering there are two options:
1. Study at NTNU with the following subject as compulsory: Structures in Ice-Infested Waters (3,75Cr, (Professor Sveinung Løset)
2. Study at UNIS, Svalbard with the following subject as compulsory: Arctic Offshore Engineering (7,5Cr, (Professor Sveinung Løset).
Apart form the compulsory subject given, a specialization normally requires at least one of the other subjects listed to be included. The professor in charge for the project work will inform about this. If the professor in charge approves it, the student could choose one subject given by others. The project work 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. The project may comprise theoretical, numerical, experimental or field studies. If possible, field work should be included. The specialization project will normally be a starting point for the thesis work in the spring term. The student can work individually or in a team.
Teaching methods and activities: Supervised project work. Depending on the number of participants the specialization subjects may be lectured, given as seminars or taken as a self-study.
Course materials: Lectures, selected texts from text books, papers etc.
Assessment: Oral/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	50/100	D
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 and understanding of the particular challenges of IT in the health services. The course is prerequisite for further studies in healthcare informatics.
Recommended previous knowledge: Basic informatics, including software engineering and data modelling.
Academic content: The health services are very information- and knowledge intensive. In addition, it is exceptionally large, complex and dynamic. The computerized patient record is viewed as a clinical tool, and its content and structure is discussed i depth, including coding, record standards, plans, requirements and legal issues. Functionality as a (future) tool for communication, cooperation and analysis and decision support is also covered. Systems architecture, computerized guidelines, security and service infrastructure and other topics may be further studied trough individual coursework.
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	02.12.2005	09.00	70/100	C
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	26.05.2006	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	20.05.2006	09.00	75/100	C
EXCERCISES			25/100	

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	07.06.2006	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	08.12.2005	09.00	100/100	D

TDT4250 Information Systems Modelling

Lecturer: Professor II John Krogstie, Professor Guttorm Sindre
Coordinator: Professor II 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 analysis and requirements models for 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 project context.
Recommended previous knowledge: Course TDT4175 Information Systems, or equivalent.
Academic content: The role of modelling in information systems development. 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	06.12.2005	15.00	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	23.05.2006	09.00	80/100	D
EXCERCISES			20/100	

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 II John Krogstie, Professor Guttorm Sindre, Professor Arne Sølvberg, Førsteamanuensis Hallvard Trætteberg
Coordinator: Professor 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	01.12.2005	09.00	33/100	D
EXCERCISES			67/100	

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 introduction to methods for the evaluation of the environmental consequences of energy systems. Methods include human and ecological risk analysis and external cost analysis. 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. Through a combination of these methods, students will be able to gain a comprehensive understanding of the environmental consequences of today's energy systems.
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. 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: DM Kammen og DM Hassenzahl (1991): Should we risk it?, Princeton University Press; E. Hertwich: Environmental Assessment of Energy Systems. Selected articles.
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	22.05.2006	09.00	50/100	C
EXCERCISES			50/100	

TEP4222 Input-Output Analysis, Trade and Environment

Lecturer: Professor Edgar Hertwich, Post doktor Glen Peters
Coordinator: Professor Edgar Hertwich
Weekly hours: Autumn: 4F+8S = 7.50 Cr
Time: Teaching time and location will be announced on the web.
Grade: Letter grade Compulsory assignments: Exercises

Learning objectives: An understanding of production systems and international value chains is increasingly important for industry and policy makers alike. This course covers national economic and environmental accounts, economic input-output analysis, the economic modeling of production technologies and the development of scenarios using dynamic input-output models, as well as trade.
Recommended previous knowledge: Linear algebra. A basic understanding of economics. An introductory course in environmental science or environmental economics.
Academic content: Input-output modeling is increasingly important in environmental analysis. The course addresses the use of input-output models in national energy policy modeling, in product life-cycle assessment, and in material flow analysis. Three cutting-edge applications are the determination of household environmental profiles for sustainable consumption, the combination of monetary input-output data and physical process models in hybrid life-cycle assessment, and the development of a generalized trade model (multi-regional input-output model) based on comparative advantage. Comparative advantage is determined by relative factor prices and by the technology and structure of national industries. The course addresses the use of existing economic and environmental data and the application of different modeling techniques in industry, public policy and for consumer information.

Teaching methods and activities: The course consists of lectures and problem sets. The course reading is mandatory. The lectures are in English. For coninuation exam, the exam may be changed to an oral exam.
Course materials: To be determined later.

Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	05.12.2005	09.00	50/100	C
EXCERCISES			50/100	

TEP4223 LCA and Eco-Efficiency

Lecturer: Professor Edgar Hertwich, Post doktor Glen Peters
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: It is recommended that students take or have taken either Industrial Ecology Introduction (TMM4200/TVM4165) or Energy and environmental consequences (TEP 4220). The number of students is limited to 50. Students from the Industrial Ecology program are guaranteed a space, and other students are admitted by the instructor based on an individual evaluation. A broad participation is desirable.
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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	15.12.2005	09.00	50/100	C
EXCERCISES			50/100	

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.
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	27.05.2006	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	16.12.2005	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: Knowledge equivalent to Sedimentology and Stratigraphy.
Academic content: Physical and chemical changes in deep buried sediments. Destruction or preservation of porosity. Silicates. Carbonates. Interpretation of "cases".
Teaching methods and activities: Exercises. 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	10.06.2006	09.00	75/100	D
MIDTERM EXAMINATION			25/100	D

TGB4235 Spreading of Pollution
Lecturer: Professor Sveinung Løset, Professor Knut Lyng Sandvik
Coordinator: Professor Knut Lyng Sandvik
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 shal have some knowledge about 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.
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/colloquiums, exercises and laboratory demonstrations. 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	05.12.2005	09.00	100/100	C

TGB4715 Petroleum Geology, Specialization
Lecturer: Førsteamanuensis Sverre Ola Johnsen, Professor Stephen John Lippard, Professor II Atle Mørk, 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).
Course materials: Given at the start of the semester.
Assessment: Oral/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	33/100	D
EXCERCISES			67/100	

TGB5100 Rock Engineering, Advanced Course
Lecturer: Professor Bjørge Brattli, Professor Charlie Chunlin Li, Professor Bjørn Nilsen
Coordinator: Professor Einar Broch
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" or to master i teknologi/siv.ing. students in the study programme "teknisk geologi" and "bygg- og miljøteknikk". The course objective is extended applied knowledge in rock engineering.
Recommended previous knowledge: The course assumes completion of the basic course TVM5100 Hydropower Planning 1 in the first year of the MSc programme or TGB4185 Engineering Geology, basic course.
Academic content: Lectures on selected topics as a supplement to the basic course, such as: Tunnels subjected to rock stress problems, pre-investigations for tunnels and dams, tunnels in soil and young rock formations, stability and rock support of tunnels, water inflow and leakage prevention, numerical modelling, unlined pressure shafts and air cushions, engineering geology of dam sites etc. Colloquiums.
Teaching methods and activities: Lectures, workshops, field studies, literature survey (English).
Course materials: R.E.Goodman: Engineering Geology, John Wiley & Sons, New York. Nilsen og Palmstrøm: Engineering Geology and Rock Engineering Handbook, Norsk Bergmekanikkgruppe 2000. Selected papers and reports.
Assessment: Oral/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	12.12.2005	09.00	67/100	D
EXCERCISES			33/100	

Department of Industrial Economics and Technology Management

TIØ4135 ICT Economics - Planning and Economics of Tele and Information Services
Lecturer: 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.
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	07.12.2005	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 processes and methods regarding innovation, product development and information management in existing organisations.
Recommended previous knowledge: Requires TIØ4160 Business Administration 1 - Permanent or temporary organizations or similar background.
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, 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	

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: None

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. Maximum 30 students.
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 other SHE-problems is discussed as well. A theoretical part of the course deals with accident models, safety measures and barriers and learning mechanisms in organisations. Organisational and individual obstacles for efficient learning and prevention are emphasized. 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	02.06.2006	09.00	60/100	A
MIDTERM EXAMINATION			20/100	A
EXCERCISES			20/100	

TIØ4270 Human Resource Management

Lecturer: Amanuensis Per Gunnar Sletten
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 the neccessary concepts and skills to be able 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 for production. 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 in groups, 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	01.06.2006	09.00	50/100	C
EXCERCISES			50/100	

TIØ4291 Industrial Environmental Policy and Management

Lecturer: Professor Annik Magerholm Fet
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 course shall give knowledge and skills i order to master all kind of activities related to the enviromental management work in companies and enterprises including implementation of environmental management systems.
Recommended previous knowledge: One or two courses on undergraduate level on environmental science, ecology or environmental studies are recommended. The course is run in English.
Academic content: The course departs from the principles of UN Global Compact, Global Reporting Initiatives (GRI) Corporate Social Responsibility (CSR). It gives insight in how environmental requirements from customers, municipality and governmental bodies in addition to other stakeholder impact the situation of the company regarding environmental challenges and competitiveness in a life cycle perspective. The course further focus on how proactive environmental management is favorable for product - and organizational development. Elements of environmental management (EMAS and ISO 14000-series) will be discussed: Identifying environmental aspects, development of environmental strategies, environmental performance indicators and implementation of environmental management systems, environmental accounting and auditing. Principles of reporting and communication will be discussed based on standardized reporting systems, the used of indices and other methods to compare environmental performances.
Teaching methods and activities: Lectures, exercises and project work. 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: Is given at semester start.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2006	09.00	50/100	D
EXCERCISES			50/100	

TIØ5150 Information and Communication Management

Lecturer: Professor Per Morten Schiefloe
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: To provide insight into challenges, opportunities, and success factors within information and communication management.
Recommended previous knowledge: The course is reserved for students at the International Master Programme in Project Management. A small number of other students may be admitted after application. The course is run in English.
Academic content: Information & Knowledge Management: Concepts of information and knowledge. Information Acquisition. Case studies. Information systems. Web-based systems. Project management information systems.
Communication, Negotiation and Conflict: Team composition, teamwork and personality types. Opinions and values. Managing stakeholders. Internal marketing. Management of conflicts. Negotiation. Intercultural negotiation. Communication supported by information and communication technologies (ICT).
Intercultural communication: Definitions of culture. Culture in business. International cultures. Impact of culture on performance. Cultural integration and communication. Ethics.
Teaching methods and activities: Lectures and colloquia. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Book and collection of articles.

Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.05.2006	09.00	60/100	D
EXCERCISES			40/100	

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 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 and stakeholders. Product development and project success criteria. 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.
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	03.12.2005	09.00	100/100	C

TIØ5210 Project Management 5 - Programme and Portfolio Management

Lecturer: 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. A small number of other students can be accepted after application. 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	22.05.2006	09.00	50/100	A
EXCERCISES			50/100	

TIØ5215 Project Management 6 - SHE and Purchasing in Projects

Lecturer: 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, but a number of other students can be admitted by application. 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	26.05.2006	09.00	50/100	A
EXCERCISES			50/100	

Department of Structural Engineering

TKT4130 Continuum Mechanics

Lecturer: 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	06.12.2005	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. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Compendium.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.05.2006	09.00	100/100	C

TKT4201 Structural Dynamics
Lecturer: Professor Svein N Remseth
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: Introduction to basis of analysis of structures exposed to dynamic loads or excitations. Some experience in dynamic response analysis and application of simple models for check of computer analyses or preliminary calculations.
Recommended previous knowledge: Prerequisites: Finite element methods for beams and frames. Mass point dynamics. Fourier-analysis.
From 2006 there will be lectures in English as required.
Academic content: The course deals with the dynamic behaviour of structures exposed to time varying and short duration actions (loads and excitations). The methods of analysis are applied to plane frame types of structures. The exercise program include finite element models and simplified models for control of computed results.
Teaching methods and activities: Lectures, numerical exercises. Laboratory projects and demonstrations of dynamic response of simple structural models. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Clough, R.W. and Penzien, J. "Dynamics of structures", 2nd Ed., McGraw-Hill 1993. Notes.
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	22.05.2006	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: Exercises

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. 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2005	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 course is primarily for students who do not attend the Industrial Mathematics Programme, and wish to learn more about Statistics. Data collection, data analysis, and graphical techniques are emphasised. The course is less theoretically oriented than TMA4260 Industrial Statistics.
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). 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	22.05.2006	09.00	80/100	A
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 an introduction to stochastic modelling and statistical methods for use in lifetime data analysis, with particular view to applications in reliability analysis and medicine.
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). 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	26.05.2006	09.00	80/100	A
EXCERCISES			20/100	

TMA5100 Calculus 4K

Lecturer: NN
Weekly hours: Summer: 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			100/100	C

Department of Marine Technology

TMR4115 Design Methods

Lecturer: Professor 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 (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: Hillier og Lieberman: Introduction to Operation Research. Lecture notes and papers.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2005	09.00	60/100	C
EXCERCISES			40/100	

TMR4125 Building of Ships and Platforms

Lecturer: Professor II Chris Mullens Braathen
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 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	06.06.2006	09.00	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 4 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	

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	09.12.2005	09.00	70/100	C
EXCERCISES			30/100	

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 coresonding 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	19.05.2006	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

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. 70% of the exercises 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.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2005	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

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 (50%), mid term exam (30%) 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: 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	23.05.2006	09.00	50/100	C
MIDTERM EXAMINATION			30/100	C
EXCERCISES			20/100	

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.
Academic content: Motions, accelerations and wave loads on high-speed vessels. 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	12.12.2005	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	06.06.2006	09.00	75/100	D
EXCERCISES			25/100	

TMR4220 Naval Hydrodynamics

Lecturer: Professor Knut Johan Minsaas
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 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 propulsion and manoeuvring systems.
Recommended previous knowledge: 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 propulsion and manoeuvring systems.
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. 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 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: Knut Minsaas: Compendium Naval Hydrodynamics.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	24.05.2006	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TMR4225 Marine Operations

Lecturer: 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 2002 version.
T.E. Berg: Lecture Notes on Under Water Vehicles.
O.M. Faltinsen: Sea Loads on Ships and Offshore Structures, Cambridge University Press.
Handouts

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	29.05.2006	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	01.06.2006	09.00	70/100	D
MIDTERM EXAMINATION			30/100	D

TMR4235 Stochastic Theory of Sealoads

Lecturer: Professor II Sverre Kristian Haver, Professor Dag Myrhaug
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	02.12.2005	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: Exercises

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 (50%), mid term exam (20%) 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: 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	10.06.2006	09.00	50/100	D
MIDTERM EXAMINATION			20/100	D
EXCERCISES			30/100	

TMR4275 Modelling, Simulation and Analysis of Dynamic Systems

Lecturer: Førsteamanuensis Eilif-Harald 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	16.12.2005	09.00	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	08.06.2006	15.00	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	02.12.2005	09.00	70/100	A
MIDTERM EXAMINATION			30/100	A

TMR5100 Marine Design and Marine Engineering, Basic Course

Lecturer: Professor Harald Valland
Weekly hours: Summer: 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: Provide the basic knowledge in marine design and marine engineering which is necessary for studies in the MSc-programme.
Recommended previous knowledge: Basic knowledge in Thermodynamics on BSc/B.Eng.-level.
Academic content: Hydrostatics and stability. System based design. Machinery systems for ship propulsion and generation of electric power. Auxiliary machinery systems.
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: Lecture notes.

Assessment: Written

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

TMR5110 Marine Design, Project

Lecturer: Professor Anders Endal
Weekly hours: Spring: 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 the thesis work within the area of marine design.
Recommended previous knowledge: Various courses within the area of marine system engineering, dependent of the topic of the thesis.
Academic content: Search study of relevant literature references, reporting of a state-of-art prestudy, including a work plan for the thesis work.
Teaching methods and activities: Supervised project.
Course materials: Not decided.

Assessment: Excercises

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

TMR5120 Design of Marine Vehicles

Lecturer: Professor Anders Endal
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: Provide practice in design of a complete marine vehicle, with subsystems.
Recommended previous knowledge: Subject Marine Design and Marine Engineering, Basic course, and subject Marine Hydrodynamics, Basic Course.
Academic content: Participate in and co-ordinate detailed design of a marine vehicle specified by the supervisor. The design should include drawings and specification of the complete vehicle as well as its subsystems.
Teaching methods and activities: The students are supposed to work in teams of 2-4 participants, with supervision in colloquim.
Course materials: Specification of the vehicle and a program for the design process.

Assessment: Excercises

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

TMR5130 Marine Design, Specialization Course

Lecturer: Professor Anders Endal
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Systems Engineering.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

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

TMR5140 Marine Structures, Basic Course

Lecturer: Professor Jørgen Amdahl
Weekly hours: Summer: 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 students basic knowledge in marine structures.
Recommended previous knowledge: Basic knowledge in statics and strength of materials at BSc/BEng-level or similar.
Academic content: The precourse deals with structural design and methods of analysis for ships and other types of marine structures. The following main topics are covered: Stress analysis of plates. Buckling of beams and plates. Design and analysis of ships, semisubmersibles and compliant platforms. Design philosophy and criteria. Rules and regulations.
Teaching methods and activities: Lectures and compulsory exercises. 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			100/100	D

TMR5150 Marine Dynamics, Basic Course

Lecturer: Professor Bernt Johan Leira
Weekly hours: Summer: 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 prinsiples 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.
Academic content: One degree of freedom systems and modelling of continous 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-hull and motion of typical floating structures e.g. floaters, and tension leg plattforms. Irregular waves and wave spectra, short- and long-term statistics of waves. Transfer functions and response statistics. Separation of vortices. Anchor lines
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: Lecture notes.
Assessment: Written

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

TMR5160 Marine Structures, Project

Lecturer: Professor Bernt Johan Leira
Weekly hours: Spring: 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 area of marine structures.
Recommended previous knowledge: Various courses within the area of marine structures and marine hydrodynamics, dependent of the topic of the thesis.

Academic content: Literature search, study of relevant literature references, reporting of a state-of-art pre-study including a work plan for the thesis work.
Teaching methods and activities: Supervisor project.
Course materials: Information at start of semester.
Assessment: Excercises

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

TMR5170 Marine Structures, Specialization Course

Lecturer: Professor Bernt Johan Leira
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Structures.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

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

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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2005	09.00	50/100	D
EXCERCISES			25/100	
MIDTERM EXAMINATION			25/100	D

TMR5190 Marine Hydrodynamics, Basic Course

Lecturer: NN
Weekly hours: Summer: 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 basic knowledge in marine hydrodynamics and ocean environment whichis necessaary for studies in the MSc programme in marine technology.
Recommended previous knowledge: Basic knowledge in fluid mechanics on BSc/BEng-level or similar.
Academic content: Review of important parts of fluid dynamics. Introduction to marine hydrodynamics. Potential flow. Linear waves. Wave induced forces on fixed and floating bodies. Motion of floating bodies.
Teaching methods and activities: Lectures and compulsory exercises.
Course materials: Lecture notes.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION			100/100	C

TMR5200 Marine Hydrodynamics, Project

Lecturer: Professor Dag Myrhaug
Weekly hours: Spring: 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 area of marine hydrodynamics.
Recommended previous knowledge: Various courses within the area of marine hydrodynamics, dependent on the topic of the thesis.
Academic content: Studying necessary literature references and working out a plan of progress for the thesis work.
Teaching methods and activities: Supervised project.
Course materials: Information at start of semester.
Assessment: Excercises

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

TMR5210 Marine Control Systems, Spesialization Course
Lecturer: Professor Asgeir Johan Sørensen
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Control Systems.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

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

TMR5220 Marine Hydrodynamics, Specialization Course
Lecturer: Professor Dag Myrhaug
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Structures.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

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

TMR5230 Nautical Science, Basic Course
Lecturer: Førsteamanuensis 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: 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support

ORAL EXAMINATION	09.12.2005	09.00	70/100	D
EXCERCISES			30/100	

TMR5240 Nautical Science, Advanced Course

Lecturer: Førsteamanuensis Egil Pedersen
Weekly hours: Spring: 3F+6Ø+3S = 7.50 Cr
Time: Not given in 2005/06
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/Exercises

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

TMR5250 Nautical Science, Project

Lecturer: Førsteamanuensis Egil Pedersen
Weekly hours: Spring: 12Ø = 7.50 Cr
Time: Not given in 2005/06
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: Førsteamanuensis Egil Pedersen
Weekly hours: Autumn: 2F+8Ø+2S = 7.50 Cr
Time: Not given in 2005/06
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			100/100	D

TMR5270 Operation Technology, Basic Course

Lecturer: Professor Magnus Rasmussen
Weekly hours: Summer: 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 basic knowledge in operation technology which is necessary for studies in the MSc-programme.
Recommended previous knowledge: BSc/BEng in marine technology related areas or in mechanical engineering.
Academic content: Overview of organization and management systems. Failure- and degradation mechanisms and their effect on performance, cost, safety and environment. Methods for condition monitoring and inspection. The maintenance function. The concept for Reliability Centered Maintenance (RCM).
Teaching methods and activities: Lectures and project work. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Lecture notes.
Assessment: Written/Exercises

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

TMR5280 Marine Engineering, Project
Lecturer: Professor Harald Valland
Weekly hours: Spring: 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 the thesis work within the area of marine engineering
Recommended previous knowledge: Various courses within the area of marine system engineering, dependent of the topic of the thesis.
Academic content: Search study of relevant literature references, reporting of a state-of-art prestudy, including a work plan for the thesis work.
Teaching methods and activities: Supervised project.
Course materials: Not decided.
Assessment: Excercises

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

TMR5290 Technical Operations of Marine Systems, Project
Lecturer: Professor Magnus Rasmussen
Weekly hours: Spring: 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 the thesis work within the area of technical operations of marine systems.
Recommended previous knowledge: Various courses within the area of marine system engineering, dependent of the topic of the thesis.
Academic content: Search study of relevant literature references, reporting of a state-of-art prestudy, including a work plan for the thesis work.
Teaching methods and activities: Supervised project.
Course materials: Not decided.
Assessment: Excercises

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

TMR5300 Marine Engineering, Spesialization Course
Lecturer: Professor Harald Valland
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Systems Engineering.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

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

TMR5310 Technical Operations, Spesialization Course

Lecturer: NN
Weekly hours: Autumn: 4F+4Ø+4S = 7.50 Cr
Time: Not given in 2005/06
Grade: Letter grade Compulsory assignments: None

Learning objectives: Supporting topics within the area of the thesis work.
Recommended previous knowledge: Compulsory subjects in the MSc-programme in Marine Systems Engineering.
Academic content: Two topics selected from a list presented for the students in connection with the project work.
Teaching methods and activities: Lectures and voluntary exercises.
Course materials: Lecture notes.
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION			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: Exercises

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	23.05.2006	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. Phase diagrams are an important part of the subject, and the calculation of phase diagrams from thermodynamic data and solution models are also included. The chemical systems in focus will be important high temperature systems relevant for metallurgy and material science and engineering.
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 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: Svein Stølen and Tor Grande, Thermodynamics of Materials, John Wiley & sons, Ltd (2004). Lecture notes and exercises.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2005	09.00	100/100	C

TMT4160 High Temperature Chemistry, Project Work

Lecturer: Førsteamanuensis Dagfinn Bratland
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 aim is to give the students a basic introduction to the experimental techniques in high temperature chemistry and related topics, including synthesis of inorganic materials.
Recommended previous knowledge: None.
Academic content: Measurement and control of temperature. Refractories in the laboratory. Laboratory furnaces. Vacuum technique, work in inert atmosphere. Synthesis of inorganic materials. Experimental work with ceramic materials. Thermal analysis, study of phase equilibria. X-ray diffraction. Electron microscopy and optical microscopy, microanalysis. FTIR spectroscopy.
Teaching methods and activities: The students are guided through a number of experimental methods and techniques, essential for the reasearch activites in the department. A 7-weeks assignment will be carried out by the students in the end of the semester. Lectures are given in English if there are students from the International master courses in Light metal production.
Course materials: In-house collection of description of the various techniques.

Assessment: Excercises

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

TMT4185 Materials Science and Engineering

Lecturer: Førsteamanuensis Børre Børresen
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 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, 6. ed., John Wiley og Sons Inc, 2002.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	14.12.2005	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: Exercises

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	30.11.2005	09.00	100/100	D

TMT4235 Refining and Recycling of Metals

Lecturer: Professor Lars Arnberg
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 a theoretical treatment of the field of treatment of molten metals, bridging extractive metallurgy and casting. To connect mechanical properties to the treatment of melts and emphasize the importance of recycling.
Recommended previous knowledge: Basic chemistry and mathematics.
Academic content: The subject gives an overview of the origin of impurities and particles in primary and recycled metal and an overview of the dependence of mechanical properties on dissolved elements and inclusions. An introduction to basic thermodynamic, kinetic and technological aspects of metal refining is presented. Aluminium and Magnesium recycling are treated. A survey of separation methods for recycled raw materials is given. An excursion to a relevant production facility is arranged.
Teaching methods and activities: Lectures, exercises and laboratory work. The laboratory work corresponds to 1 hour per week. 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: Engh, T. A., "Principles of Metal Refining", Oxford University Press, 1992.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2006	15.00	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	10.12.2005	09.00	100/100	D

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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	33/100	D
EXCERCISES			67/100	

Department of Product Design

TPD5100 Ecodesign, Advanced Course

Lecturer: Førsteamanuensis Trond Are Øritsland
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 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2006	09.00	60/100	B
EXCERCISES			40/100	

Department of Petroleum Engineering and Applied Geophysics

TPG4120 Engineering and Environmental Geophysics

Lecturer: Professor Ole Bernt Lile
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: 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	05.12.2005	09.00	50/100	D
EXCERCISES			50/100	

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. The lectures will be held in english if international masterstudents attend.
Course materials: Compendiums.

Assessment: Oral/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	19.05.2006	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 topic shall give a basic introduction of two main topics within reservoir engineering; reservoir fluids physical behavior and flow in wells.
Recommended previous knowledge: None.

Academic content: The PVT part describes reservoir fluid properties, hydrocarbon phase behavior, PVT labtests, 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 50% of the final grade. Project work, PBL. Lectures are held in English. The exam can be changed from written to oral at the postponed exams (continuation exam). 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	05.12.2005	09.00	50/100	C
EXCERCISES			50/100	

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 TPG4110 Fluid Flow in Porous Media/Fluid Mechanics 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	08.12.2005	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 TPG41110 Fluid Flow in Porous Media/Fluid Mechanics, 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	31.05.2006	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 will give an understanding of seismic methods used in reservoir geology and reservoir management.
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	23.05.2006	15.00	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 carry out petrophysical 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 sourse 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 50% 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: Schole, P., A. Bebout, D.G, and Moore, C.H., eds: Carbonate depositional environments. American Association of Petroleum Geologists, Memoir 33.
Assessment: Written/Midterm

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	12.12.2005	09.00	50/100	D
MIDTERM EXAMINATION			25/100	D
MIDTERM EXAMINATION			25/100	D

TPG4180 Petrophysics, Interpretation of Well Data, Advanced Course

Lecturer: Professor II Terje Eidesmo, Professor Rune Martin Holt, Amanuensis Helge Langeland, Professor Ole Bernt Lile
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 tests will count 25% on the exam grade. At retake exam, an oral exam may replace written exam.
Course materials: Articles, lecture notes and other relevant literature.
Assessment: Written/Midterm

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.06.2006	09.00	50/100	D
MIDTERM EXAMINATION			25/100	D
MIDTERM EXAMINATION			25/100	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 topic will give a deeper understanding and an introduction to application of rock mechanics in petroleum recovery, withing reservoir engineering, drilling and production.
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. Reservoir monitoring.
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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	03.12.2005	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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	13.12.2005	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 field data acquisition, 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. The lectures are held in English if international masterstudents attend. Exercises are mandatory. The exam can be changed from written to oral at the postponed exams (continuation exam).
Course materials: M. B. Dobrin and C.H. Savit: Introduction to Geophysical Prospecting, 4th ed., McGraw-Hill Book Company, 1988.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2005	09.00	100/100	C

TPG4205 Drilling Techniques Pressure Control

Lecturer: Førsteamanuensis Pål Skalle
Weekly hours: Spring: 2F+2Ø+8S = 7.50 Cr
Time: Not given in 2005/06
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			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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	15.12.2005	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: Provide insight 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	09.06.2006	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 methods for analyzing flow in fractured reservoirs.
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	22.05.2006	09.00	100/100	A

TPG4230 Well Technology

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: The topic aims to give an extensive insight in well construction and well maintenance.
Recommended previous knowledge: None.
Academic content: The course addresses the following topics: Production systems including well configurations, gathering system and surface processing and stabilization of produced fluids. Production performance of wells and fields. Connectivity between reservoirs and the well. Flow in wells and production systems. Well construction and well interventions. Well

equipment and mechanical analysis. Well service and well stimulations, introduction to artificial lift. Well completions and deep water operations.
Teaching methods and activities: Lectures and exercises. Exercises count for 40% of the final grade. Lectures will be 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: Given at semester start.
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	27.05.2006	09.00	60/100	B
EXCERCISES			40/100	

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 (Lile/Langeland/Eidesmo)(3,75 CR) Rock Acoustics (Holt) (3,75 CR) PVT/ EOR/GAS (Whitson) (3,75 CR) Reservoir evaluation (Jelmert) (3,75 CR) Fractured reservoirs (Torsæter) (3,75 CR) Reservoir simulation (Kleppe) (3,75 CR) Reservoir physics (Torsæter) (3,75 CR)
Teaching methods and activities: The topic is divided in two, one project work equivalent to 15 CR and a specialized study equivalent to 7,5 CR. 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	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. 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 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 CR), Modelling and simulation of production processes (Golan) (3,75 CR), Flow in production wells (Asheim) (3,75 CR), Natural gas technology (Gudmundsson) (3,75 CR), Production- and process technology (Gudmundsson) (3,75 CR)
Teaching methods and activities: The topics are divided into two, one project work corresponding to 15 Cr and a specialized study corresponding to 7.5 Cr. 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	33/100	D
EXCERCISES			67/100	

TPG4710 Drilling, 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 Cr), Drilling fluid technology (Pål Skalle)(3,75 Cr), Formation Mechanics (Rune M. Holt) (3,75 Cr), Underbalanced Drilling (Arild Rødland) (3,75 Cr), Geothermal Energy Drilling (Arild Rødland) (3,75 Cr), Deep Water Technology (Sigbjørn Sangesland) (3,75 Cr), Well Technology (Sigbjørn Sangesland) (3,75 Cr).
Teaching methods and activities: The specialization is divided in two parts, a project work corresponding to 15 Cr and a specialized study corresponding to 7.5 Cr. 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	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 CR), PVT/EOR/GAS (C.H.Whitson)(3,75 CR), Reservoir Evaluation (T.Aa.Jelmert) (3,75 CR), Fractured Reservoirs (O.Torsæter)(3,75 CR), Applied reservoir simulation (J.Kleppe)(3,75 CR), Reservoir Physics (O.Torsæter)(3,75 CR)
Teaching methods and activities: The course consists of project work with a work load corresponding to 15 CR and specialized studies corresponding to 7,5 CR. 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	09.00	33/100	D
EXCERCISES			67/100	

TPG4720 Petroleum Geosciences, 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)(3,75CR), Geoscience fieldcourse at Svalbard (Tjåland)(3,75CR), Gravimetry and magnetometry (Skilbrei)(3,75CR), Fractured reservoirs (Torsæter)(3,75CR), Petrophysics, selected theory, methods or computer applications (Lile/Langeland/ Eidesmo)(3,75CR), Plate tectonics and basin development (Torsvik)(3,75CR), Reservoir seismics (Ursin)(3,75CR), Seismic imaging of sedimentary layers, field course (Landrø/Johansen)(3,75CR), Seismic Topics (Tjåland)(3,75CR)
Teaching methods and activities: The subject is divided in two parts, a project work, worth 15 CR and a specialized study (courses) worth 7,5 CR. 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	01.12.2005	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.

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	29.05.2006	09.00	100/100	D

TPG5120 Petrophysics, Basic Course

Lecturer: Amanuensis Helge Langeland, Professor Ole Bernt Lile
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: 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. Methods of pp data acquisition including mudlogging, coring, wireline and fewd logging. Principles of measuring techniques, incl. gamma ray, density, neutron, sonic, formation pressure testing, resistivity, pulsed neutron, nuclear magnetic resonance, borehole, casing and production measurements. Practical experience with cores. Basic log interpretation methods, Archie equation. Practical log evaluation methods in simple situations and predominately siliciclastic environments. Influence of shale, rudimentary concepts on interpretation of shaly formations.
Teaching methods and activities: Lectures and exercises. Semester tests count total 50% 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

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2005	09.00	50/100	D
MIDTERM EXAMINATION			25/100	D
MIDTERM EXAMINATION			25/100	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	16.12.2005	15.00	100/100	C

TPK4160 Value Chain Control and Applied Decision Support

Lecturer: Post doktor Heidi Dreyer, Professor Bjørn Nygreen, Professor II Jan Ola Strandhagen
Coordinator: Post doktor Heidi Dreyer
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 subject is to give the students a thorough understanding and knowledge regarding value chain principals and how value chains can be established, managed and improved.
Recommended previous knowledge: TPK4100 Operation Management.
Academic content: Value chain management from a production and logistics perspective: Consepts, market and customers, distribution and production, supply, operation management, ICT, advanced planning and scheduling and design (localization, make/buy, outsourcing). Use of operation research and applied decision support methodology for 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 there is a re-sit 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2005	09.00	60/100	A
EXCERCISES			40/100	

TPK5100 Project Management 1

Lecturer: Førsteamanuensis Bassam A Hussein
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: None

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 (50%) and final exam (50%). 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: PMI, A guide to project management body of knoweldge(PMBOK Guide), 2000 edition. project management institute.
Wysocki, R. McGary, R. Effective project management. Third eddition, Wiely 2003.
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	12.12.2005	09.00	50/100	A
EXCERCISES			50/100	

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 and probability theory.
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 re-sit 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	08.12.2005	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 given in 2005/06
Grade: Letter grade Compulsory assignments: Exercises

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	C

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 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	03.12.2005	09.00	100/100	C

TPK5160 Risk Analysis
Lecturer: Professor II Stein Haugen, Professor Marvin Rausand
Coordinator: 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: None

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 measures. 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 re-sit examination, the examination form may be changed from written to oral.
Course materials: Specific course compendium.
Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	30.11.2005	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: None

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 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/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.05.2006	09.00	70/100	C
EXCERCISES			30/100	

Department of Engineering Cybernetics

TTK4130 Modelling and Simulation

Lecturer: Professor Olav Egeland
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 goal of the course is that the students should learn methods for the modeling and simulation of physical plants for use in control applications.
Recommended previous knowledge: TTK4105 Control Engineering or TTK4140 Control Engineering and Electrical Circuits.
Academic content: Mathematical modeling: Models based on state-space, transfer functions, networks models with unilateral interconnections. Analysis based on frequency response, energy-based methods and passivity. Signal-flow versus energy-flow for interconnection of models. Development and interconnection of subsystem models in a modular approach to modeling. Models for electrical motors, hydraulics, friction, vehicles and manipulators, balance equations for mass. momentum and energy in control volume, isentropic gas dynamics, and compressor dynamics. Simulation of state-space models, Runge-Kutta methods, stiff systems, stability. Brief introduction to the simulation of partial differential equations using finite elements (FEM) and finite volumes (CFD).
Teaching methods and activities: Lectures, compulsory problem sets and computer exercises based on MATLAB and software for FEM and CFD. 8 approved problem sets are required, whereof 3 are compulsory computer exercises. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Olav Egeland og Jan Tommy Gravdahl, Modeling and Simulation for Automatic Control, Marine Cybernetics, 2002.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	26.05.2006	09.00	100/100	D

TTK4150 Nonlinear Control Systems

Lecturer: Professor Kristin Ytterstad Pettersen
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 shall give the students a theoretic foundation and skills necessary to analyse and design nonlinear control systems.
Recommended previous knowledge: The courses TTK4105 Control Systems and TTK4115 Linear System Theory, or similar knowledge. It is an advantage, but not a prerequisite, to follow the course TMA4145 in parallell with this course.
Academic content: Methods for analysis and design of nonlinear systems, with an emphasis on nonlinear control systems. The course includes:
1) Mathematical models of nonlinear systems, and fundamental differences between the behavior of linear and nonlinear systems. Equilibrium points, limit cycles and general invariant sets.
2) Phase plane analysis, Lyapunov stability, Input-to-state stability, Input-Output stability, Passivity analysis and the Describing Function Method.
3) Nonlinear control design, including Energy-based control, Cascaded control, Passivity-based control, Input-Output linearization, Backstepping and Gain-scheduling.
Teaching methods and activities: Lectures, assignments and a laboratory project. Four out of six assignments and the laboratory project has to be approved. The final grade is based on a portfolio assessment. The portfolio includes a midterm test 20% and a final exam 80%. The results for each part of the portfolio are given in %, while the result of the total portfolio is graded by letter. If there is a re-sit examination, the examination form may be changed from written to oral.
Course materials: Khalil: Nonlinear Systems, 3rd edition, Prentice Hall, 2002. Conference and Journal papers.

Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	19.12.2005	09.00	80/100	D
MIDTERM EXAMINATION			20/100	D

TTK4190 Guidance and Control

Lecturer: Professor Thor Inge Fossen
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, underwater vehicles, high-speed craft, flight vehicles and spacecraft. 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. 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	07.06.2006	09.00	70/100	A
MIDTERM EXAMINATION			30/100	A

Department of Electronics and Telecommunications

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	06.12.2005	09.00	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	20.05.2006	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: Exercises

Learning objectives: The course aims to give a thorough introduction to theory, methodology and application of material flow analysis at different levels 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, 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: To be announced at the start of the course.

Assessment: Written/Exercises

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	20.05.2006	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

Learning objectives: The course aims to give a good theoretical and practical introduction to the modern field of Industrial ecology, in a way such that the student becomes conscious of the complex relations in such matters, and understands how methods, analytical tools and principles within the field may be applied in practice.
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. This is then used as a basis for quantitative evaluation of the environmental and economic efficiency of a product system within this sector, and for assessing options and barriers for improvement of this product system.
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: To be announced at the start of the course.
Assessment: Portfolio assessment

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2005	15.00	50/100	D
EXCERCISES			50/100	

TVM5105 Hydrology for Hydropower, Basic Course

Lecturer: Førsteamanuensis Knut Alfredsen, Professor Ånund Killingtveit
Coordinator: 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	30.11.2005	09.00	100/100	D

TVM5115 Planning and Design of Dams, Basic Course

Lecturer: Professor Odd E. Gjørv, Professor Lars Olav Grande, Førsteamanuensis Leif Lia, 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 of the MSc programme Hydropower Development and third or fourth year of the siv.ing. studies in Civil and Environmental Engineering. This course, TVM5115 together with TVM5145 is replacing the course TVM5100 Hydropower Planning 1 in the HPD study programme. 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.
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	09.12.2005	09.00	100/100	D

TVM5125 Hydraulic Design, Basic Course

Lecturer: Professor II Odd Guttormsen, Professor Torbjørn Kristian Nielsen, 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. This course TVM5125 together with TVM5105 is replacing the course TVM5110 Hydropwoer Planning 2 in the HPD study programme. The course covers the basics in planning and hydraulic design of the waterways of a hydropower plant 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 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	03.12.2005	09.00	100/100	D

TVM5130 Hydropower Plants, Project Work

Lecturer: Førsteamanuensis 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. This course TVM5135 together with TVM5140 is replacing the course TVM5120 Hydropower Planning 3 in the HPD study programme. 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	06.12.2005	09.00	100/100	D

TVM5140 Environmental and Economic Assessment of Hydropower Projects, Basic Course

Lecturer: Professor II Odd Guttormsen, Professor Haakon Støle
Coordinator: 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: Exercises

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. This course TVM5140 together with TVM5135 is replacing the course TVM5120 Hydropower Planning 3 in the HPD study programme. 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	19.05.2006	09.00	100/100	D

TVM5145 Geology and Tunnelling, Basic Course

Lecturer: Professor Einar Broch, Professor Amund Bruland, Professor Bjørn Nilsen, Professor Haakon Støle
Coordinator: 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: 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. This course TVM5145 together with TVM5115 is replacing the course TVM5100 Hydropower Planning 1 in the HPD study programme. 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	22.05.2006	09.00	100/100	D

TVM5150 River System Analysis, Advanced Course

Lecturer: Førsteamanuensis Knut Alfredsen, Professor Ånund Killingtveit
Coordinator: 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 "bygg og miljøteknikk". The course objective is extended knowledge of computer and numerical model applications in river system studies.
Recommended previous knowledge: The course assumes completion of the basic course TVM5110 Hydropower Planning 2 (refer to catalogue for 2004/05) in the first year of the HPD-programme or TVM4105 Hydrology.
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	01.12.2005	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 "bygg og miljøteknikk". The course covers planning, design and operation of headworks in sediment carrying rivers.
Recommended previous knowledge: The course assumes completion of the basic course TVM5100 Hydropower Planning 1 and TVM5110 Hydropower Planning 2 (refer to catalogue for 2004/05) in the first year of the HPD programme or TVM4116 Fluid Mechanics and preferably TVM4140 Water Resources Management.
Academic content: Extended discussion of sediment transport theory and use of water resources in sediment loaded rivers, reservoir sedimentation, headworks for run-of-river hydropower plants, sediment handling techniques, sediment sampling programmes and analysis of sediment data.
Teaching methods and activities: Lectures, workshops, assignments and extensive laboratory exercises.
Course materials: Lysne, Glover, Støle and Tesaker: Hydraulic Design. Vanoni: Sedimentation Engineering. Støle: Withdrawal of Water from Himalayan Rivers, World Commision on Dams: Dams and Development and hand-out literature with supplementary articles, cases and lecture-notes (English).
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	08.12.2005	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: Exercises

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 assumes completion of the basic course TVM5120 Hydropower Planning 3 (refer to catalogue for 2004/05) in the first year of the MSc programme.
Academic content: The course consists of 15 modules, and one new module is presented every week. The course consists of: 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 (English).
Assessment: Oral

Forms of assessment	Date	Time	Percentage	Exam. support
ORAL EXAMINATION	05.12.2005	09.00	100/100	D

PhD courses

MT8301 Carbon Materials Technology
Lecturer: Professor II Morten Sørlie
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 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 autumn 2005. 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: Mandatory exercises. May include carbon materials characterization by optical microscopy, scanning electron microscopy, image analysis, porosimetry, etc. Towards the end of the semester each student has to present a 30 min colloquium within a narrow part of the curriculum.
Course materials: Literature: Selected parts from published books and articles from publications.
Assessment: Oral

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

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	19.05.2006	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: Exercises

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.
Required previous knowledge: GEOG1000-1006 or the equivalent.
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.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	10.12.2005	09.00	100/100	C

GEOG3561 Gender and Social Change

Lecturer: Post doktor 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 Norwegian and international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues.
Required previous knowledge: For Norwegian students: Bachelorgrad or “mellomfag” in Geography. Other relevant qualifications can be accepted if approved by the Department.
Academic content: The course offers an introduction to the main themes of Norwegian and 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.
Form of assessment:Written exam (4 hours).
Course materials: Given at the start of the semester.

Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	06.12.2005	09.00	100/100	

Department of Sociology and Political Science

POL1003 Environmental Politics

Lecturer: Førsteamanuensis Gunnar Fermann
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: 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 2nd. Lectures for 14 weeks.
Teaching methods and activities: Teaching methods and activities: Lectures, seminars and project work.
Compulsory activity: Approved term paper.

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.
Course materials: Given at the start of the semester.
Assessment: Assignment/Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	07.06.2006	09.00	50/100	D
ASSIGNMENT			50/100	

POL1004 Globalization: Norway in International Society

Lecturer: Professor Jonathan Moses
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: 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.
Form of assessment:3-hour written exam.
Course materials: Given at the start of the semester.
Assessment: Written

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

SOS3050 Empirical Research Methods in tne Humanities and Social Sciences

Lecturer: Stipendiat Zan Strabac
Weekly hours: Autumn: 2F+4Ø+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 provide students with basic knowledge in the use of various research methods in the Social Sciences and the Arts.
Recommended previous knowledge: None.
Academic content: The course provides an introduction to the most important relevant empirical research methods regarding the Arts and Social Sciences. Techniques for the gathering of data include interviewing, observation and the use of written sources and public documents. A basic introduction to the analysis of data, emphasising charts, correlation and graphic forms of presentation, will also be offered.
The course is equivalent to SOS1002 Research Methods in the Social Sciences (7,5 credits). Students studying for a Master's Degree in Media, Communication and Information Technology, who have already completed SOS1002 Research Methods in the Social Sciences, are exempt from taking SOS3050. These students are to choose a course covering 7,5 credits from the above list.
Teaching methods and activities: Teaching method and activities: Lectures 2 hours per week for 14 weeks, group teaching 2 hours per week, lab work and supervision when writing term paper.
Compulsory activity: Approved term paper.
Form of assessment: 4 hours written exam.
Course materials: Given at the start of the semester.
Assessment: Written

Forms of assessment	Date	Time	Percentage	Exam. support
WRITTEN EXAMINATION	02.12.2005	09.00	100/100	D

Experts in a Team, Interdisciplinary team project (EiT)

Learning objectives: The intention of the interdisciplinary team project Experts in a Team (EiT) is to prepare the students for work life through training in utilizing their knowledge in an interdisciplinary team. The students should work on a problem that preferably has its source from real life or the business world. Through the interdisciplinary project the students should gain skills that enable them to work together with people from different professional backgrounds and to ensure that they can function as a team. To achieve this knowledge they should gain:

- Insight into their own expertise and what it can bring to the team effort
- Insight into how their behaviour affects the group and how the group affects them
- Skills to be able to solve an interdisciplinary problem

Required previous knowledge: EiT is compulsory for the following students:

- Students taking the five year engineering degree program in the eighth semester (Can not be taken as a part of "Subjects from advanced classes" or as a voluntary subject)
- Students following some of the 2 year engineering master programs.
- Students following master programs at the Faculty of Arts, Faculty of Information Technology, Mathematics and Electrical Engineering and Faculty of Natural Sciences and Technology.

Other applicants must be qualified to apply for a masters program in the spring term of 2006.

Academic content: Through participation in the project the students are trained in how to:

- Handle group processes so that professional integrity, creativity and interdisciplinary cooperation are ensured.
- Utilize and develop their professional expertise in an interdisciplinary team setting.
- Communicate across different disciplines.
- Take responsibility for the planning and progress of the project.
- Find and utilize relevant literature and academic counsellors'.
- Oral presentation of the project work.

Teaching methods and activities: The learning approach in EiT is based on experience in the sense that the learning takes place through the processes that manifests itself in each team. EiT is organized in "villages" (village = class) of up to 30 students; each "village" is divided in groups of approximately 5 students from different disciplines. The "village" is characterized by a broad interdisciplinary theme and often with a commission from an external party.

Each group develops their own problem within the theme of the "village" and they are also responsible for the planning and the progress of the project work. The task of the leader of the "village" is to create an environment for the learning processes in the groups that will stimulate the students to reflect on the interdisciplinary cooperation and their own field of expertise. The students may seek guidance or help from any faculty member at the University or other professionals outside the University.

At the end of the semester the students have to hand in two reports; one process report, a project report and a possible product. The project report should contain how the students solved problem and how the product materialized.

The process report should deal with how the team cooperated when they tried to solve the problem, and they should also discuss the learning objectives individually and how the learning objectives influenced the result of the product.

The product can be e.g. a report, a book, a film, a play, a computer program, a painting or anything else the group chooses. The expectations and evaluation criteria for the final reports are described in a separate document.

The first "village" day is the 11th of January 2006. Milestones for each "village" will be given at the beginning of the semester. The intention of the milestones are, amongst other things, to ensure progress, give feedback and create an environment for reflection on the individual groups process both on the project and on the relations between the members of the team. The semester is divided into three phases. The first phase has the intention of promoting a good environment for learning in the "village" and in the individual teams, establishing team contracts for cooperation, identifying a problem to work on and a time schedule for the project.

In the second phase the emphasis is placed on status reporting, oral presentations and feedback on the project and group process.

In the last phase the focus is on independent work and tailored guidance for each team and finishing the project and a presentation of the final result.

Attendance is compulsory every Wednesday throughout the semester. Students that do not attend the first "village" day will not be permitted to follow the course that semester but through either illness or collision with other approved study activities students may apply for exemption from attending the first day. Absence, for no matter what reason, for more than four "village" days will result in a fail grade. EiT runs as normal in the activity weeks for the engineering students in the period 27.02-10.03.2006 but the individual "village" can accommodate the students in the "village".

"Village" themes will be published on the web at the beginning of the autumn semester 2005. Enrolment and the list of desired "villages" must be submitted by the 15th of November 2005 through the EiT home page: www.eit.ntnu.no. The students will be divided in the "villages" based on their application list. Applications that arrive after the 15th of November will not be processed.

The "villages" are more closely defined in the subject/course description from the relevant institute. A selected few "villages" will be run intensively in blocks over a short period of time. (Engineering students will normally not be able to participate in the intensive "villages".) Which "villages" this applies to will be announced closer to the enrolment.

The final reports will be judged according to the grades A-F. The team will receive a joint grade. The product and the product report account for 60% of the mark, while the process report accounts for the remaining 40% of the final grade. An oral

presentation is part of the evaluation and must be approved before the final grade is set. Both the product and process report can be handed in as instalments during the semester at agreed times. As a trial project some of the “villages” will have a pass/fail grade. Which “villages” this entails will be announced closer to enrolment. Engineering students will no be able to choose “villages” were the grade “pass/fail” is utilised.
Course materials: Will be specified at a later date.
Assessment: Exercises.

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.

Outline of the programme
The MPhil Programme requires two years of full-time studies, and starts in the autumn semester (mid-August). The normal workload for a full-time student for one academic year is 60 credits. The first year of the programme is devoted to a combination of courses, comprising a total of 60 credits. Of these at least 30 credits have to be from Master's level courses (3000-courses), but up to 30 credits may be obtained from advanced courses (2000-courses). Second year students are expected to work exclusively on their master's thesis, which also counts for a total of 60 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

Course code	Course title	credits	Semester	Restricted admission
ENG2153	First and Second Language Acquisition	7.5	Spring	
ENG2154	Language and Communication	7.5	Autumn	
ENG2155	Theoretical and Practical Aspects of Grammar and Translation	7.5	Spring	
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 programme of study Master of Philosphy n 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	ENG2154 Language and Communication

Students who want to include other courses offered by the Department of Modern Foreign Languages (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 education plan.

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 MPhil 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.

Course code	Course title	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 examinations
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.

Fieldwork
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 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

ENG2153 First and Second Language Acquisition
Lecturer: Professor Mila Dimitrova Vulchanova
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Low undergraduate language and linguistics courses
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: Will vary
Teaching methods and activities: Seminars, discussions and individual supervision. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG2154 Language and Communication
Lecturer: Associate Professor Paul Michael Goring
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Low undergraduate courses in language and linguistics
Required previous knowledge: None
Learning objectives: To achieve an understandig of how the interpretation of complex expressions can be computed and how people handle and exploit ambuiguities, polysemy and other semantic phenomena in daily communication.
Academic content: The course is designed for those who take an interest in meaning as expressed in natural language.
It addresses how linguistic objects, such as words and sentences, relate to entities out in the world and whether this

relationship is mediated by concepts; how meaning can be represented formally in an optimal way and how such representations can be
employed in other areas of linguistic analysis, such as e.g. syntax; how and why language differs from other communication systems; how language is employed for special purposes, as e.g. in advertising and how it contributes to the content of the message contained in an ad.
Course materials: Will vary
Teaching methods and activities: Seminars, discussions and individual supervision. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG2155 Theoretical and practical issues of English grammar and translation
Lecturer: Professor Mila Dimitrova Vulchanova
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Low undergraduate language and linguistics courses
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: Will vary
Teaching methods and activities: Seminars, discussions and individual supervision. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG3001 Theory and Method
Lecturer: Associate Professor Paul Michael Goring
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Bachelor’s Degree with specialization in English.
Required previous knowledge: None
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 and other research projects.
Course materials: Will vary
Teaching methods and activities: Individual supervision. Assessment: Home exam approx. 2500 words/5-7 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG3122 Cognitive and Theoretical Aspects of Language
Lecturer: Associate Professor Paul Michael Goring
Teaching: Spring: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

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: Will vary
Teaching methods and activities: Lectures/seminars. Assessment: Home exam approx. 4000 words/10-12 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG3123 Translation
Lecturer: Professor Mila Dimitrova Vulchanova
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Bachelor's Degree with specialization in English.
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: Will vary
Teaching methods and activities: Lectures/seminars. Assessment: Home exam approx. 2500 words/5-6 pages.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

ENG3910 Master's Thesis in English Language and Linguistics
Lecturer: Professor Mila Dimitrova Vulchanova
Teaching: 1st sem. springr, 2nd sem. autumn: 60.0 Cr
Grade: Letter grade

Compulsory assignments: None

Required previous knowledge: Bachelor's degree in English language or in Linguistics, or equivalent.
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.
Assessment:

Forms of assessments	Time	Percentage	Deadline
THESIS		1/1	
ORAL EXAMINATION			

MASTER OF PHILOSOPHY IN MARITIME ARCHAEOLOGY

Outline of the programme
The MPhil Programme requires two years of full-time study, and starts in the autumn semester. 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.

Courses

MPhil in Maritime Archaeology

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
4 Spring	ARK3095 Thesis Seminar			
3 Autumn	ARK3040 Management of Maritime Heritage	ARK3050 Maritime Archaeological Science	ARK3095 Thesis Seminar	
2 Spring	ARK3015 Maritime Culture II	ARK3025 Maritime Archaeological Field Research II	ARK3030 Archaeological Oceanography	ARK3095 Thesis Seminar
1 Autumn	ARK3010 Maritime Culture I		ARK3020 Maritime Archaeological Field Research I	ARK3095 Thesis Seminar

Topics offered in the programme
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 programme of study in deep-water archaeology including the use of technology and methods developed at NTNU.
Conservation of Underwater Archaeological sites.

Teaching and examinations
Each course has a take-home examination. 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 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

ARK3010 Maritime Culture I
Lecturer: Professor Marek Edward Jasinski
Teaching: Autumn: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: Bachelor degree in Archaeology.
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: A written assignment of 2000-3000 words must be completed. A passing assignment is required to sit the exam. The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3015 Maritime Culture II
Lecturer: Professor Marek Edward Jasinski
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

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 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3020 Maritime Archaeological Field Research I
Lecturer: Professor Marek Edward Jasinski
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

Recommended previous knowledge: Bachelor degree in archaeology.
Academic content: - Maritime archaeology on land and under water including application of archaeological principles in underwater environments and associated skills.
Teaching methods and activities: The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3025 Maritime Archaeological Field Research II
Lecturer: Professor Marek Edward Jasinski
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

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: The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3030 Archaeological Oceanography
Lecturer: Professor Marek Edward Jasinski
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

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: The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3040 Management of Maritime heritage
Lecturer: Professor Marek Edward Jasinski
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

Recommended previous knowledge: Bachelor degree in archaeology.
Academic content: - National and international management systems. - Maritime heritage and the public.
Teaching methods and activities: The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3050 Maritime Archaeological Science
Lecturer: Professor Marek Edward Jasinski
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: None

Recommended previous knowledge: Bachelor degree in archaeology.
Academic content: - Preservation. - Dating. - Measurements and reconstructions.
Teaching methods and activities: The home-exam will be maximum 5500 words long. Information on the time frames is provided at the start of the semester.

Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

ARK3095 MPhil Master Thesis
Lecturer: Professor Marek Edward Jasinski
Teaching: 1st sem. springr, 2nd sem. autumn: 60.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

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:

Forms of assessments	Time	Percentage	Deadline
THESIS		1/1	

MASTER OF PHILOSOPHY IN LINGUISTICS

Outline of the programme
The MPhil Programme requires two years of full-time study, and starts in the autumn semester. The credits are divided between courses comprising of a total of 75 credits, and a thesis of 45 credits. 60 credits represents the normal workload for a full-time student for one academic year. The courses may include both intermediate courses (LING2000 courses) and master's courses (LING3000 courses) of the candidate's choice, but at least 15 credits must be at master's level (LING3000). The courses should be 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	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	Master´s Thesis in Linguistics	45	Autumn and Spring	*)
*) LING3392: Requires admission to the programme of study Master of Philosophy in Linguistics.				

Teaching and examinations
Each course, whether intermediate or master's, has a home examination, (one week for 7.5 credits and two weeks for 15 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.

MPhil in Linguistics: example with emphasis on grammar and pragmatics

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
Spring 4	LING3392 MPhil Thesis			
Autumn 3	LING3392 MPhil 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	

MPhil in Linguistics: example with emphasis on phonology and pragmatics

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
Spring 4	LING3392 MPhil Thesis			
Autumn 3	LING3392 MPhil Thesis		LING2221 Intonation	
Spring 2	LING3003 Pragmatics III		LING3006 Phonology III	
Autumn 1	LING2202 Phonology II	LING2204 Pragmatics II	LING2222 Language Typology	

MPhil in Linguistics: example with emphasis on syntax

Semester	7.5 credits	7.5 credits	7.5 credits	7.5 credits
Spring 4	LING3392 MPhil Thesis			
Autumn 3	LING3392 MPhil 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	

Course descriptions

LING2201 Syntaks II
Syntax II
Lecturer: Professor Lars Hellan
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1101 Syntaks I.
Learning objectives: The objective is that the students actively can apply a formal syntactic theory on a language, regardless of the typological classification of that language.
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, and also aims to give students the skills to solve empirical problems independently.
Teaching methods and activities: Lectures and group work. Obligatory exercises must be approved before students are
allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2202 Phonology II
Lecturer: Professor Thorstein Fretheim
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1102 Fonologi 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 work. Obligatory exercises must be approved before students are
allowed to hand in the semester paper.

Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2203 Semantics II
Lecturer: Professor Lars Hellan
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1103 Semantikk 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 work. Obligatory exercises must be approved before students are allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2204 Pragmatics II
Lecturer: Professor Thorstein Fretheim
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1104
Learning objectives: The objective is to enable the students to read original literature on pragmatic topics and to base their work with the semester 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 work. Obligatory exercises must be approved before students are
allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
HJEMMEEKSAMEN		1/1	

LING2206 Computational Linguistics I
Lecturer: Professor Torbjørn Nordgård
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: EXFAC0004 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 and parsing algorithms. A basic introduction to Prolog will be provided if necessary.
Teaching methods and activities: Lectures, group work and laboratory teaching. Obligatory exercises must be approved before students are admitted to the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2207 Grammar Engineering I
Lecturer: Professor Lars Hellan
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1101, LING1103, LING2201 and LING2203.
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 work and laboratory teaching. Obligatory exercises must be approved before students are allowed take the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2216 Computational Linguistics II
Lecturer: Professor Torbjørn Nordgård
Teaching: Autumn: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING2206, SIF5060 or equivalent.
Learning objectives: Students will learn about statistical approaches to automatic language processing.
In addition, the students will learn how feature structures can be used as the formal basis for development of large-scale grammars.
Academic content: This course continues with rule-based strategies in language technology, with a focus on unification-based formalisms and their relation to technological systems like machine translation. The course also includes statistically based techniques, with special emphasis on part of speech tagging and combinations of rule-based and probability-based techniques.
Teaching methods and activities: Lectures, group work and laboratory teaching. Obligatory exercises must be approved before the student is admitted to take the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2217 Grammar Engineering II
Lecturer: Professor Lars Hellan
Teaching: Spring: 7.50 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1101, LING1103, LING2201, LING2203 and LING2207.
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 and group work. Obligatory exercises must be approved before students are allowed to take the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
WRITTEN HOME EXAM		1/1	

LING2221 Intonation
Lecturer: Professor Thorstein Fretheim
Teaching: Autumn: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING2202, LING2204.
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 work. Obligatory exercises must be approved before students are allowed to take the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
HJEMMEEKSAMEN		1/1	

LING2222 Language Typology
Lecturer: Professor Lars Hellan
Teaching: Autumn: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

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 work. Obligatory exercises must be approved before students are allowed to take the exam.
Assessment:

Forms of assessments	Time	Percentage	Deadline
HJEMMEEKSAMEN		1/1	

LING3001 Syntax and Semantics
Lecturer: Professor Lars Hellan
Teaching: Both autumn and spring: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: 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 work. Obligatory exercises must be approved before students are allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3003 Pragmatics III
Lecturer: Professor Thorstein Fretheim
Teaching: Spring: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: 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 work. Obligatory exercices and oral presentation must be approved before students are allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3005 Grammar Engineering III
Lecturer: Professor Lars Hellan
Teaching: Autumn: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: 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 work and laboratory teaching. Obligatory exercises must be approved before students are allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3006 Phonology III
Lecturer: Professor Thorstein Fretheim
Teaching: Both autumn and spring: 15.0 Cr
Grade: Letter grade

Compulsory assignments: Important: Contact your department!

Recommended previous knowledge: LING1102 Phonology I and LING2202 Phonology 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 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 work. Obligatory oral presentation must be approved before students are allowed to hand in the semester paper.
Assessment:

Forms of assessments	Time	Percentage	Deadline
ASSIGNMENT		1/1	

LING3392 MPhil Thesis in Linguistics
Lecturer: Professor Thorstein Fretheim, Professor Lars Hellan
Coordinator: Professor Lars Hellan
Teaching: Both autumn and spring: 45.0 Cr
Grade: Letter grade

Compulsory assignments: None

Required previous knowledge: Requires admission to the MPhil 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: 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 (ling 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:

Forms of assessments	Time	Percentage	Deadline
THESIS		1/1	

MASTER OF PHILOSOPHY IN DEVELOPMENT STUDIES, SPECIALIZING IN GEOGRAPHY

Approved by the Board of NTNU on 16 December 2002, with changes made by the Faculty of Social Sciences and Technology Management on 7 December 2004.
The Master in Social Change is a programme designed for students who want to specialize 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 international and Norwegian students. There are 10 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.

Outline of the programme
The programme involves 2 years of full-time studies. The programme is structured around core courses (45 credits), electives (30 credits) and a Master's thesis (45 credits).
Due to a change in the credit system at NTNU, the normal workload for a full-time student for one academic year is 60 credits, as compared to 20 credits prior to August 2003.
The core courses are: GEO3050 Theories of Social Change, GEOG3051 History of Geographical thought and GEOG3052 Research Methodology.
Students can choose electives worth 30 credits from a number of courses offered by the Department of Geography. Most of the electives will be offered in the autumn semester. Students can earn a maximum of 15 credits in GIS/ Remote sensing (i.e. either GEOG3510 or GEOG3511). Courses offered by other departments can be chosen as electives if approval is given by the Department of Geography.

Core courses

Course code	Course title	Credits	Semester	Restricted admission
GEOG3050	Theories of Social Change	15	Autumn	
GEOG3051	History of Geographical Thougt	15	Spring	
GEOG3052	Research Methodology	15	Spring	
GEOG3920	Master´s Thesis	45	Autumn/ Spring	Yes

Electives

Course code	Course title	Credits	Semester	Restricted admission
GEOG3505	Landscape and Planning	15	Autumn	
GEOG3506	Geography, Health and Development	7.5	Autumn	
GEOG3510	Geographical Information Systems (GIS)-Principles and Application	15	Autumn	Yes
GEOG3511	Remote Sensing	15	Autumn	Yes
GEOG3515	Environment, Development and Changing Rural Livelihoods	7.5	Autumn	
GEOG3516	Humanitarianism: Theory and Practice	7.5	Autumn	
GEOG3050	Theories of Social Change	15	Autumn	
GEOG3561	Gender and Social Change	7.5	Autumn	
AAR4945	Planning and Construction in Developing Countries	7.5	Spring	Yes

MPhil in Development Studies: example

Semester	15 credits		15 credits	
Spring 4	GEOG3920			
Autumn 3	GEOG3920		Electives	
Spring 2	GEOG3051		GEOG3052	
Autumn 1	GEOG3050		Electives	

Candidates are expected to use the summer between the second and third semesters to collect data and conduct fieldwork for their thesis. The thesis is expected to be completed within four semesters from admission to the course. Supervision will not be given beyond this. The thesis must be written in English.

Course descriptions

GEOG3050 Theories of Social Change
Course responsibility: Professor Ragnhild Lund
Credits: 15
Compulsory assignments: Semester assignment/Project work
Required previous knowledge: Bachelor in geography. Other relevant qualifications can be accepted if approved by the Department.
Learning outcomes: Students will broaden their knowledge of theories of social change through an introduction to different analytical perspectives on the study of social change.
Course contents: GEOG 3050 Theories of Social Change is compulsory for students in the Master in Social Change programme and elective for students in the Master in Geography programme. The course serves as an introduction to the main theme of the Social Change programme. Students will broaden their knowledge of theories of social change through an introduction to different analytical perspectives on the study of social change.
The course will focus on conceptualizations of development and social change, and on themes such as the relationship between growth and poverty, globalization and processes of marginalization. The course will also include presentations of relevant empirical material from research within development studies. The teachers for the course represent several disciplines within the social sciences. The course is divided in two parts. The first part emphasizes development theories, while the second part is more concerned with how relevant issues are dealt with in development research. Part two is common with GEOG3504.
During the course, the students will write an assignment which will be presented to the group of students. The assignment is marked and constitutes 50% of the grade, the written examination constitutes the other 50%.
Course materials and media: Will be given when the semester starts.
Teaching methods: Lectures and an assignment.
Examination: 6 hour written examination

GEOG3051 History of Geographical Thought
Course responsibility: Professor Ragnhild Lund
Semester: Spring
Credits: 15
Compulsory assignments: Semester assignment/Project work
Learning outcomes: Students will be able to understand the historical development of central geographical ideas and approaches relevant to the conceptualising, implementation and writing of a Master's thesis.
Course contents: This course is only for students who are taking the Master in Social Change programme. The course deals with the historical development of central geographical ideas and approaches relevant to the conceptualizing, implementation and writing of a Master's thesis.
Course materials and media: Will be given when the semester starts.
Teaching methods: Lectures (18 hours), seminars(16 hours) and an assignment. The course is divided into two sections. The first section, based on lectures and readings, focuses on theory. The second section, grounded in seminar participation, focuses on preparing and writing a paper on how the history of geographical thought can be related to the formulation of the thesis.
Examination: Oral examination

GEOG3052 Research Methodology
Course responsibility: Associate Professor Stig Halvard Jørgensen
Semester: Spring
Credits: 15
Compulsory assignments: Field trip 7-10 days (incl. preparations; compulsory)
Learning outcomes: The aim of the course is twofold. One main goal is to prepare the student for using methodology in his/her master´s thesis. The other main goal is to give the students skills and experience in a

fieldwork situation through a common field course.
Course contents: 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.
Teaching methods: Lectures, seminars and practical work 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. This is a joint assignment for GEOG 3051 and GEOG 3052.
Course materials and media: Will be given when the semester starts.
Lectures: 14 hours Seminars:12 hours Field course:7-10 days (incl. preparations)
Requirement: Approved field course with report and assignments/exercises
Examination: Assignment and oral examination

GEOG3920 Master‘s Thesis in Social Change
Course responsibility: NN
Credits: 45
Compulsory assignments: None
Required previous knowledge: This course is only for students who are taking the Master in Social Change programme.
Course contents: The student must prepare a project proposal of at least 4 pages before the 15 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. 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: Seminars with emphasis on theoretical and practical issues related to the writing of a Master's thesis will be held during the first and second years. 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 semester.
Examination: Thesis and oral. The oral examination is used to adjust the grade given for the thesis.

Electives

AAR4945 Planning and Construction in Development Countries
Course responsibility: Professor Hans Christie Bjønness
Semester: Spring
Credits: 7.5
Compulsory assignments: None
Required previous knowledge: The course gives priority to course AAR4525 Urban Ecological Plan-ning in Developing Countries. Project Work, and course AAR4820 Urban Ecological Planning. Theory, and AAR4816 Urban Ecological Planning, Method.
Learning outcomes: 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.
Course contents: 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-disaster 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 the UN/NORAD template. Project evaluation.
Teaching methods: 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.
Examination: 4 hour written examination

GEOG3505 Landscape and Planning
Course responsibility: Associate Professor Gunhild Setten
Credits: 15
Compulsory assignments: Approved semester/Project work
Required previous knowledge: Specialization in Geography or the equivalent.
Learning outcomes: The course aims to give insight into theoretical and methodological problems in connection with landscape seen in relation to planning.
Course contents: 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.
Course materials and media: Announced at the beginning of semester.
Teaching method: 30 hours lectures.
Examination: Oral examination.

GEOG3506 Geography, Health and Development
Course responsibility: Associate Professor Stig Halvard Jørgensen
Credits: 7.5
Compulsory assignments: Approved semester/Project work
Required previous knowledge: GEOG1000-1006 or the equivalent.
Learning outcomes: 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, avail-ability and accessibility, prevention, and treatment.
Course contents: The main emphasis of the course is on the situation in developing coun-tries, 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' per-spectives 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 and media: Announced at the beginning of semester
Teaching methods: 20 hours lectures, 8 hours seminars.
Examination: 4 hour written examination.

GEOG3510 Geographic Information Systems (GIS) Principles and Application
Course responsibility: Associate Professor Jan Ketil Rød
Credits: 15
Compulsory assignments: Approved semester/Project work
Recommended previous knowledge: Mathematics (linear algebra), statistics or data processing (programming, database, graphic data processing) equivalent to 7.5 credits.
Required previous knowledge: Specialization in Geography or the equivalent.
Learning outcomes: The course aims to provide advanced knowledge on geographical information systems (GIS).
Course contents: The course provides a comprehensive overview of the use of GIS func-tions. It also gives a comprehensive introduction to GIS components such as hardware, software, organization, and databases. Students become acquainted with how the technology can be used in social and physical scientific research objectives. They are introduced to different program packages and become familiar with methods for data collection and the

evaluation of the quality of their datasets. Students are also introduced to simple programming and the use of GIS on the Internet. During the semester students will carry out a number of short exercises, together with a larger project assignment. These must be approved before the examination can be taken. The oral examination is based on the project work and course syllabus.
Course materials and media: Announced at the beginning of the semester.
Teaching methods: 22 hours lectures, 48 hours practical and project.
Examination: 6 hour written examination.

GEOG3511 Remote Sensing
Course responsibility: Associate Professor Axel Baudouin
Credits: 15
Compulsory assignments: Approved semester/Project work
Recommended previous knowledge: Mathematics (linear algebra), statistics or data processing (programming, database, graphic data processing) equivalent to 7.5 credits.
Required previous knowledge: Specialization in Geography or the equivalent.
Learning outcomes: The aim of the course is to give an introduction in the use of satellite images in approaches to geographical problems.
Course contents: 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.
Course materials and media: Announced at the beginning of the semester.
Teaching methods: 24 hours lectures, 24 hours practical and project work.
Examination: Oral examination.

GEOG3515 Environment, Development and Changing Rural Livelihoods
Course responsibility: Associate Professor Haakon Lein
Credits: 7.5
Compulsory assignments: Group work and presentation
Required previous knowledge: For Norwegian students: Bachelorgrad or "mellomfag" in Geography.
Other relevant qualifications can be accepted if approved by the Department.
Learning outcomes: The course will explore different conceptualizations and (mis-) understandings of the links between development, environment and environmental change and (rural) livelihood in African and Asian societies.
Course contents: 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 live-lihood analysis; from farm to non-farm and implications for the rural environments. *Environment and conflicts. The "Environment" as basis for conflicts.
Teaching methods: Lectures: 18 hours. Group work and presentations (obligatory)
Examination: 4 hour written examination

GEOG3516 Humanitarianism: Theory and Practice
Course responsibility: Post doktor Cathrine Brun
Credits: 7.5
Compulsory assignments: semester paper
Recommended previous knowledge: The course is given at master's level, a background equivalent to Bachelor in social sciences or extensive field experience is recommended.
Learning outcomes: This course will investigate the role of conflict-related humanitarian aid in geopolitics. Embedded in humanitarian action are a number of contentious issues regarding the relationships between political aims of donors and host governments and the needs and aspirations of beneficiaries. The course will stress the relationship between theory and practice and how to deal with operational dilemmas on the ground.
Course contents: 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 a one day compulsory introductory seminar. A semester paper counts for 50% of the final grading together with a written examination (50%).
Teaching method: Internet based, equivalent to 16 hours, 1-day compulsory introductory seminar.

Examination: 4 hour written examination. The final grading is based on the semester paper (50%) and written examination (50%).

GEOG3561 Gender and Social Change
Course responsibility: Post doktor Cathrine Brun
Credits: 7.5
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 outcomes: The course offers an introduction to the main themes of Norwegian and international social scientific research on gender, and provides a theoretical platform for further studies on gender-related issues.
Course contents: The course offers an introduction to the main themes of Norwegian and 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 method: 18 hours lectures.
Examination: 4 hour written examination.

MASTER OF PHILOSOPHY IN HUMAN DEVELOPMENT

Outline of the programme
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 overarching concerns throughout the course include but are not limited to:

1.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.

2.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.

3.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 multifinality that means many agents interact in a dynamic way. Therefore, the impact of shifting individual coping styles upon society cannot be separated or isolated from 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.

Courses

Course code	Course title	Credits	Semester
PSY3XX7	Master´s Thesis	30	4/spring
PSY3XX7	Master´s Thesis	15	3/autumn
PSY3XX6	Individually Selected Text	15	3/autumn
PSY3XX4	Specialization in Biological and Cognitive Aspects of Development	7.5	2/spring
PSY(or SANT)3XX5	Specialization in Relational and Cultural Aspects of Development	7.5	2/spring
PSY3XX3	Research Methodology, Theories of Sciences and Ethics	15	2/spring
PSY3XX1	Biological and Cognitive Aspects of Development	15	1/autumn
PSY3XX2	Relational and Cultural Aspects of Development	15	1/autumn

Courses descriptions

PSY3XX1 Biological and Cognitive Aspects of Development
Credits:15
Teaching semester: Autumn
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Block teaching: lectures and seminars
Syllabus: 800 p
Examination: Four papers (Pass/Fail)
Deadlines: Submission of papers 2 weeks after end of block teaching.
Learning outcomes: The course will provide the basis conceptual tools for the understanding of biological and cognitive aspects of change processes underlying human development.

Course 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.

PSY3XX2 Relational and Cultural Aspects of Development
Credits: 15
Teaching semester: Autumn
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Block teaching: lectures and seminars
Syllabus: 800 p
Examination: Four papers (Pass/Fail)
Deadlines: Submission of papers 2 weeks after end of block teaching.
Learning outcomes: The course will provide the basis conceptual tools for the understanding of interpersonal, social, and cultural aspects of change processes underlying human development.

Course 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.

PSY3XX3 Research Methodology, Theories of Sciences and Ethics
Credits:15
Teaching semester: Spring
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Lectures, seminars, field work, and exercises,
Syllabus: 800 p
Examination: 6 hour written examination on Quantitative Methods. examination papers on Qualitative Methods, Theories of Sciences and Ethics. Letter grades on each part. The parts' grades will be weighted in the final grade.
Deadlines: Submission of papers 2 weeks after end of each part's teaching.
Learning outcomes: The course will "provide a foundation in theories of sciences for the choice of research

methods.
Provide insight in the ethical implications of different methodological approaches to research.
Provide a foundation for autonomously developing and carrying out:
- a structured interview and a questionnaire
- an experimental design
- a qualitative research design
Provide knowledge of width in scientific designs as a basis for adequate choice of methods and practical implementation of research projects.

Course 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 analysing 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 PSY3XX4 and SANT (or PSY) 3XX5. 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.

PSY3XX4 Specialization in Biological and Cognitive Aspects of Development
Credits: 7.5
Teaching semester: Spring
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Tutorials, exercises, project work and oral presentation
Compulsory activities: Oral presentation
Examination: Two paper presentations, written and oral (Pass/Fail)
Deadlines: Schedules for oral presentation is set up before 31 January. Submission of written paper on 15 March.
Learning outcomes: The course should provide an opportunity for both theoretical and practical knowledge in cognitive and/or biological aspects 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.

Course 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.

PSY (or SANT) 3XX5 Specialization in Relational and Cultural Aspects of Development
Credits: 7.5
Teaching semester: Spring
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Block teaching: lectures and seminars
Syllabus: 800 p
Examination: Two paper presentations, written and oral (Pass/Fail)
Deadlines: Submission of papers 2 weeks after end of block teaching.
Learning outcomes: The course should provide an opportunity for both theoretical and practical knowledge in interpersonal, social, and cultural aspects 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.

Course 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.

PSY3XX6 Individually Selected Text
Credits: 15
Teaching semester: Autumn
Semester cycle: Flexible cycle, graduate level
Teaching methods and activities: Self study
Syllabus: Individually selected, 800 p
Examination: Individual paper, approximately 15 to 20 pages, submitted at the end of the semester. Letter grade.
Deadlines: In agreement with examiner and administration
Learning outcomes: Extensive knowledge of an area of particular interest to the student.

Course content
The student chooses the subject, and a syllabus of approximately 800 pages, for the paper. This is to be approved by the course 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 Master's Thesis.

PSY3XX7 Master's Thesis
Credits: 45
Teaching semesters: Autumn and spring
Teaching methods and activities: Self study
Examination: Master's Thesis and oral examination. Letter grade.
Deadlines: In agreement with examiner and administration
Learning outcomes: After having completed the Master's Thesis the student should have acquired ability to carry out a scientific research project, think in a principled and logical way, work independently, carry out a large project within a predefined time frame.

Course content
The Master's 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 IDR3XX4 and SANT3XX5. The student should contact teachers at the Master's program for advice on choice of subject.
Supervision is an important part of the work with the Master's 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 Master's Thesis. The subject for the Master's 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.

The thesis can be a paper to be submitted for publication or a manuscript of not more than 150 pages. There are specific rules for how a Master's Thesis should be written, as well as criteria for grading a thesis. The Department provides these on request.

Examination in PSY3XX7 is passed in the last semester of the programme and the student register for the examination on a specific form provided by the Department, in addition to regular examination registration.
The Master's Thesis is submitted in six copies.

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.

Course code	Course title	Credits	Semester
SPO3010	Medicine for non-MD´s	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

SPO3010 Medicine for non-MD's.
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Functional anatomy and physiology from cell to organ, health and activity related diseases, ethical aspects in medicine and research.

SPO3020 Training Circulation and Oxygen Consumption.
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Circulatory function, supply and demand. Limitations and adaptations in patients and athletes

SPO3030 Training Muscle and Force Production.
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Muscle architecture, changes, neural adaptations, limitations and functional adaptations in patients and athletes. Motor skill.

SPO3040 Environmental Adaptations
Credits: 7.5
Teaching semesters: Autumn
Learning outcomes: Diving, high altitude, exercise in cold and hot environments

SPO3050 Research Methods in Exercise Physiology
Credits: 15
Teaching semesters: Spring
Learning outcomes: Introduction to theories of science and basic statistics.

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	Course code	Title	Autumn	Spring
1. semester	AAR4525	Urban Ecological Planning in Developing Countries. Project work	15 credits	
1. semester	AAR4816	Urban Ecological Planning. Method	7.5 credits	
1. semester	AAR4820	Urban Ecological Planning. Theory	7.5 credits	
2. semester		Electives (see list)		15 credits
2. semester	AAR5300	Urban Ecological Planning in Diverse Cultures		15 credits
3. semester	AAR5200	Analysis of Field Work for MSc Thesis in Urban Ecological Planning	15 credits	
3. semester	FP4350	Planning Theoryand Planning Process Skills	7.5 credits	
3. semester		Electives (see list)	7.5 credits	
4. semester	AAR5400	Master´s Thesis		30 credits

Course descriptions

AAR4525 Urban Ecological Planning in Developing Countries. Project Work
Course responsibility: Professor Hans Christie Bjønness
Duration: 1 semester (autumn semester 2005)
Credits: 15
Teaching methods: The project is based on two months of intensive fieldwork in a city in a developing country. The students are engaged with the real on site experience, through cooperation with local interest partners, together with formal and informal institutions. This is to give insight in the premises and the content of the local transformation processes, and demands for constructive solutions for improvement. Local people are engaged to conduct a stronger and better group work. The project is presented for local users, interest partners, planners and local students and teachers. The group project is done in Norway with emphasis on theory and method.
Learning outcomes: Group work and seminars. This is a very intensive course, where the project work is at the centre. This is an international course with NORAD and quota students, European exchange students and Nordic students. The accomplishment of the course gives emphasis to multicultural and multidisciplinary studies.
Course reading: Compendium prepared by the person with course responsibility.
Examination: Evaluation of group work and presentation.

AAR4816 Urban Ecological Planning. Method
Course responsibility: Professor Hans Christie Bjønness
Duration: 1 semester (autumn semester 2005)
Credits: 7.5
Teaching methods: The method will be applied in the project work which starts with two months of intensive fieldwork in a city in a developing country. The students are engaged with real on-site experience, through cooperation with local interest partners, together with formal and informal institutions. In this work integrated action planning will be central, in addition will the students apply the Logical Framework Approach. This is based on NORAD and the UN's standard for project planning. The methodology gives emphasis to working methods which gives insight in the local background of transformation processes, and to conduct constructive solutions for improvement. How can the local community and its premises be advocated? The project is presented for local users, interest partners, planners and local students and teachers. The group project is done in Norway with emphasis on theory and method.
Learning outcomes: Seminars. This is a very intensive course, where the project work is the main assessment. International course with NORAD and international quota students, European exchange students and Nordic students. The course places emphasis on multicultural and multidisciplinary studies.
Course reading: Compendium prepared by the person with course responsibility.
Examination: Oral examination.

AAR4820 Urban Ecological Planning. Theory
Course responsibility: Professor Hans Christie Bjønness
Duration: 1 semester (autumn semester 2005)
Credits: 7.5
Teaching methods: The theory will be applied in the project work which starts with two months of intensive fieldwork in a city in a developing country. The students are engaged with real on-site experience, through cooperation with local interest partners, together with formal and informal institutions. The theory emphasizes principles within urban ecological planning, central discussion of development and modernization paradigms,

theories within alternative development, theory of sustainable use of areas and urban approaches in developing and industrialized countries. Theoretical issues within communicative and democratic planning will also be discussed. The aim is to gain understanding in the local background of transformation processes, and conduct constructive solutions for improvement. The project is done in Norway with emphasis on method and theory.
Learning outcomes: Seminars. This is a very intensive course, where the project work is the main basis for assessment.
International course with NORAD and international quota students, European exchange students and Nordic students. The course puts emphasis on multicultural and multidisciplinary studies.
Course reading: Compendium prepared by the person with course responsibility.
Examination: Oral examination.

AAR5300 Urban Ecological Planning in Diverse Cultures
Course responsibility: Professor Hans Christie Bjønness
Duration: 1 semester (spring semester 2006)
Credits: 15
Learning outcomes: The course will elaborate on theories of urban ecology and on methods of urban ecological planning and management. There will be introductions to value issues in theory, and to process-oriented and system-based theory taking up conditions for urban transformation and the complexity of relationships.
Planning and management methods for sustainable urban development based on urban ecological principles will be addressed through analysis of relevant international and Nordic case studies. Issues theory and method will be discussed in relation to urban ecological planning at various levels of planning, boundaries, processes of segregation and urban transformation.
Teaching methods: Concentrated lectures, seminars and project work. The students must be prepared to participate actively. The writing of an essay is required.
Course reading: Compendium prepared by the person with course responsibility.
examination: semester paper which will be assessed.

FP4350 Planning Theory and Planning Skills
Course responsibility: Professor Tor Medalen
Duration: 1 semester (autumn semester 2006)
Credits: 7.5
Learning outcomes: The course seeks to give an understanding of the history of planning. Classical theories of planning, and their development until today, are presented and discussed. Practical examples and references present the theoretical material.
Teaching methods: Concentrated lectures, seminars and project work. The students must be prepared to participate actively. The writing of an essay is required.
Course reading: Friedmann, John (1987). Planning in the public domain: From knowledge to action Princeton University Press, Princeton, New Jersey
Forester, John (1989). Planning in the face of power. California University Press, Berkeley, California
Sager, Tore (1994). Communicative planning theory. Avebury, Aldershot, England
Schön, Donald A (1983). The reflective practitioner: How professionals think in action. Basic books, New York.
Compendium with additional papers.
Examination: Semester paper which counts 1/3 in the final evaluation
Written examination.

AAR5400 Master of Science Thesis in Urban Ecological Planning
Course responsibility: Professor Hans Christie Bjønness and /or appointed supervisors
Credits: 30
Outline of the programme: The thesis consists of a scientific presentation of a chosen topic. The thesis should be about 100 pages. The student must prepare a project proposal of at least 4 pages before 15 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 of the thesis. Seminars with emphasis on theoretical and practical issues related to the writing of a Master's thesis will be held during the first and second years. 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.
Assessment: Thesis and presentation. The presentation is used to adjust the grade given for the thesis.
This course is only for students who are taking the full study in MSc in Urban Ecological Planning.

AAR5200 Analysis of Fieldwork for Master´s Thesis in Urban Ecological Planning
Course responsibility: Professor Hans Christie Bjønness and /or appointed supervisors
Credits: 15

Duration: 1 semester (autumn semester 2006)
Teaching methods: A fieldwork plan is to be presented for and approved by the person with the course responsibility and / or the appointed supervisor prior to the fieldwork. The fieldwork is for a two month period during the summer between the second and third semesters.
The fieldwork should preferably be in the home country of the participant from a developing country. During the third semester the fieldwork results will be recorded, analysed and presented.
Assessment: Based on pre-fieldwork plan, recording and analysis of fieldwork results and presentation.

Electives:

Course code	Course codeTitle	Note	Autumn	Spring
AAR8100	Housing Theory and History	1	7.5 credits	
GEOG3050	Theories of Social Change	1	15 credits	
GEOG3561	Gender and Social Change	1	7.5 credits	
GEOG3505	Landscape and Planning	1	15 credits	
GEOG3506	Geography, Health and Development	1	7.5 credits	
AAR5250	Preparation for Fieldwork for Master´s students	2		7.5 credits
GEOG3052	Research Methodology	2		15 credits
AAR4945	Planning and Construction in Developing Countries	2		7.5 credits
AAR5260	GIS in Urban Planning	2		7.5 credits

1)
Autumn:
Elective courses offered during the autumn can only be selected if a study plan tailored to the MSc thesis course is agreed with the Faculty, and recommended by the MSc thesis supervisor and the person with the course responsiibility.

2)
Spring:
Elective courses amounting to 15 Credits are to be selected from the above list.

AAR5250Preparation for Fieldwork for Master's Students
Course responsibility: NN
Duration: 1 semester (spring semester)
Credits: 7.5
Learning outcomes: The course is to give basic knowledge of research to students who are to use research methods in relation to a project.
The student learns how to write a project proposal how to carry out a research project and write a research report.
The student will learn to read and evaluate research reports based on different methods and approaches.
Various research methods will be reviewed (hypothesis-testing vs. hypothesis generating, deductive vs. inductive) in relation to real projects and literature about research methods. Through presentation of their own projects, students will learn to evaluate their own and others research designs. Written presentations will be revised to become a project proposal.
It is recommended to take the course in ”Preparations for Fieldwork for Master’s Students” or the GEOG 3052 course in ”Research Methodology”. Students are recommended to apply for admission also in ”Preparations for Fieldwork for Master’s Students” if they apply for GEOG 3052. Places in for GEOG 3052 are limited.
Examination: Student assessment is based on exercises and paper.

GEOG3052 Research Methodology
Course responsibility: NN
Duration: 1 semester (spring semester)
Credits:15
This course is only for students who are taking the MPhil in Social Change.
Aims and description of the course: The course will give an introduction to research methodology and different kinds of research methods, covering both qualitative and quantitative approaches. The aim of the course is to give students the necessary tools for their thesis work, concerning defining a research problem, making a research design, and techniques for data collection and analysis.
The course builds on a common introductory course and a choice of modules. Each student chooses 1 out 2 modules, one covering quantitative and one covering qualitative methodologies.

The field trip is a compulsory part of the course. One of the aims of the field trip is to give students practical training in using different methods. Participation in preparatory lectures and seminars for the field trip is compulsory. After the field trip all students must write contributions to a common report (group work). The report contributions have to be approved by the Department, but a grade will not be given.
It is recommended to take the course in ”Preparations for Fieldwork for Master’s Students” or the GEOG 3052 course in ”Research Methodology”. Students are recommended to apply for admission also in ”Preparations for Fieldwork for Master’s Students” if they apply for GEOG 3052. Places in for GEOG 3052 are limited.
Field trip: 7-10 days (incl. preparations compulsory
Assessment: Assignment and oral examination

AAR4945 Planning and Construction in Developing Countries
Course responsibility: Professor Hans Christie Bjønness
Duration: 1 semester (spring semester)
Credits: 7.5
Aims and description of the course: The course offers an introduction to issues that are important for an understanding of planning, construction and infrastructure in developing countries (ideology, cultural, social and geographical issues, economy, resources, technology, etc.). Focus will be on those features that differ fundamentally from industrialized countries, with particular emphasis on problems related to the practical implementation of projects.
The project work, which is a compulsory part of the course, emphasizes project planning techniques, and gives an introduction to writing a project document using the UN format.The course is interdisciplinary both in content and participation. The course is offered for MPhil in Social Change students and also for students at other faculties at NTNU.
Course reading: Compendium prepared by the person with course responsibility.
Examination: Approved compulsory project-work and written examination.

AAR5260 GIS in Urban Planning
Course responsibility: Associate Professor Alf Ivar Oterholm
Duration: 1 semester (spring semester)
Credits: 7.5
Aims and description of the course: 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: the 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 et al., 2002: An Introduction to Geographical Information Systems.
Examination: Oral examination

AAR8100 Housing Theory and History
Course responsibility: Professor Sven Erik Svendsen
Duration: 1 semester (autumn semester)
Aims and description of the course: The objective is to provide an increased understanding of the development of the shelter sector in view of historical, cultural and professional factors. A presentation of relevant theoretical and historical issues and a discussion of different typologies and of contemporary housing and settlement interventions will form the main content of the course. Classes will be conducted as seminars based on a list of compulsory literature.
Examination: An essay, or a semester paper dealing with an agreed topic within the theme of the course to be written at the end of the course.

GEOG3050 Theories of Social Change
Course responsibility: NN
Credits: 15
Teaching semester: 1 semester (autumn)
Teaching methods: Lectures, 28 hours
Aims and description of the course: GEOG3050 Theories of Social Change is compulsory for students taking the MPhil in Social Change and elective for students doing a Master´s in Geography. The course serves as an introduction to the main theme of the Social Change programme. Students will broaden their knowledge of theories of social change through an introduction to different analytical perspectives on the study of social change. The course will focus on conceptualizations of development and social change, and on themes such as the relationship between growth and poverty, globalization and processes of marginalization.
The course will also include presentations of relevant empirical material from research within development studies. The teachers for the course represent several disciplines within the social sciences.
MSc in Urban Ecological Planning course have to apply for this course. Limited places. Compulsory assignment
Assessment: Written examination (6 hours)

GEOG3561 Gender and Social Change
Course responsibility: NN
Credits: 7.5
Teaching semester: 1 semester (autumn)
Aims and description of the course: The course offers an introduction to the main themes of Norwegian and international social scientific research on gender, and provides a theoretical platform for further studies of gender-related issues. The course seeks to combine an interdisciplinary and course-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 will be treated. The course will also include presentations of empirical material from gender-specific research within the field of geography and other social scientific disciplines. The course will be based on a few introductory lectures and on individual study with reading lists.
MSc in Urban Ecological Planning course have to apply for this course. Limited places.
Assessment: Written examination (4 hours)

GEO3505 Landscape and Planning
Course responsibility: NN
Credits: 15
Duration: 1 semester (autumn)
Aims and description of the course: The course discusses theoretical and methodological questions concerning landscape in relation to planning. The course will consider landscape as a concept, landscape values, and theoretical and methodological problems within landscape planning and landscape management. Social Change students will write an individual paper based on the recommended reading for the course.
Geography Master´s students will participate in a project exercise in which students carry out fieldwork, interviews and document analysis of an actual planning situation in which landscape and environmental values are involved. The project work will normally be carried out as group work. The aim of the project is to give insight into how and to what extent regard for the landscape and the environment will be taken into account in planning and management, and also to illustrate which landscape and environmental problems are encountered in the general planning process. The lectures will normally be given in English. Social Change students will write their individual paper in English. The practical coursework for Geography Master´s students will be conducted in Norwegian, and the group reports will normally be written in Norwegian.
MSc in Urban Ecological Planning course have to apply for this course. Limited places.
Assessment: Project/practical work + oral examination. One combined grade for the project paper and the oral examination will be given.

GEOG3506 Geography, Health and Development
Course responsibility: NN
Credits: 7.5
Teaching semester: 1 semester (autumn)
Teaching methods: The course will be given in English and is designed for 3 groups:
- Students on the MPhil in Social Change (anticipated to be the largest group)
- Other (Norwegian) Geography Master´s students
- Master´s students studying Health in ISH who take this course as an elective (listed in the study plan as an optional course for this study).

Learning outcomes: The course provides a general introduction to geographical aspects in health, with two main focuses:
Health status, disease/injury and risk/risk factors
The geography of different levels of health services, with emphasis on demand and use, offer and access ability, development, and treatment (self treatment, care and cure)
Aim and description of the course: The course has a development perspective with emphasis on the situation in developing countries. More general international development trends are also covered. In addition to a common core curriculum, in-depth courses (curriculum options) are available: one which focuses on developing countries and one which is on western countries (focusing on the situation in Norway). The course covers studies on approaches to quantitative and qualitative methods. Case studies. Part of the course will be based on individual reading, which will provide a basis for carrying out the assignment. These projects will be presented in seminars. A seminar will also be held on researching health and health geography in libraries and databases (3 hours).
Assignment and presentation must be approved before the student is allowed to take the examination.
MSc in Urban Ecological Planning course have to apply for this course. Limited places. Compulsory assignment and presentation.
Assessment: Written examination (4 hours)

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 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		
2	Autumn	Optional*		Master´s thesis	
1	Spring	Optional*	Optional*	Optional*	Master´s thesis
1	Autumn	Optional*	Optional*	Optional*	Master´s thesis

Optinal: See list below for eligible courses. To be discussed with the supervisor.

Examination: For each course an examination, 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, 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
TFY 4220 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
TFY 4255 Material Physics
FX Biophysics II (assumed approved)
TFY 4205 Quantum Mechanics
TFY4210 Applied Quantum Mechanics
TFY 4280 Signal Analysis
FY3201 Atmospheric Physics
TFY 4195 Optics
TFY4235 Numerical Physics

2 Year autumn
FY3114 Functional Materials
TFY 4265 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.

TFY 4220 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. 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
Written examination: 4 hours
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: Egbert Boeker and Rienk Van Grondelle: Environmental Physics, Wiley 1999. John Twidell and Anthony D. Weir: Renewable Energy Resources, 1987. 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 Emil J Samuelsen
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: Professor Arne Brataas
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 Asle Sudbø
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 Helge Redvald Skullerud
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: Murry L. Salby. Atmospheric Physics, Academic press 1996
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 Anders Carl G. Johnsson
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 Bjørn Torger Stokke
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. Fluorescence and phosphorescence. 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 2005/2006

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 2005/2006 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 11 February 2003 in accordance with the Act of 12 May 1995 relating to Universities and Colleges, no. 22 §§ 40, 46, 47, 48, 49, 50 and 52.

Chapter 1 Scope, Purpose and Definitions

§ 1 Scope and Purpose

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 properly carried out.

§ 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 the programme catalogue.

main profile
Courses in the programme catalogue 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.

grade
The grade given in 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 programme catalogue 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.

When these regulations refer to the Act relating to Universities, this means the Act of 12 May 1995 relating to Universities and Colleges, no. 22, including amendments, the last of which are passed as an Act, dated 28 June 2002 no. 62.

Chapter 2 Admission and curriculum

§ 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 The right to study and study progress
Admission involves the right to take the courses in the programme of study or separate courses which the student has gained admission to. The right to study provides the opportunity to take the courses specified in the individual education plan or in accordance with the study progress approved by the Faculty. The right to study is valid from the day NTNU receives confirmation of the student's acceptance of his/her admission.
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's performance (study progress) is insufficient, according to the definition given in § 4 subsection 3
the student himself/herself confirms that he/she has withdrawn from the programme of study before it is completed.
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. §§ 5, 7, and 8.
It is to be evident from the programme catalogue whether the programme of study is divided into years, ref. § 14 subsection 1.
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 § 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.
A student who has gained admission to a programme of study and has had normal study progress (without adjustment for leave or reduced study progress), 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 study progress.
A student who has gained admission to a programme of study 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, 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 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 study progress 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. § 6 subsection 2.

§ 6 Registration
Students with the right to study at NTNU have to register for study and pay the semester fee at NTNU every semester before the deadline set by the University Director. The deadlines are given in the programme catalogue and on the Internet pages of NTNU.

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.

Students who are not obliged to agree on an individual education plan or who have not yet agreed on their individual education plan also have the duty to register. This registration is to indicate which courses the student will attend and receive assessment in.

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
The Faculty is to handle applications for leave. 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 without stating a reason.
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.
The student must accept that there may be changes in the programme of study during a period of leave.

§ 8 Part-time studies
Studies at NTNU may be taken on a part-time basis following agreement with the Faculty. The percentage of the normal study progress is to be included in the individual education plan.

§ 9 Students without the right to study
Those who have not been granted admission to study, have the right to receive assessment in a course in accordance with the Act relating to Universities § 40. The Faculty decides whether the requirements for registration have been fulfilled and may specify further regulations concerning the access to assessment in the absence of normal admission.
The University Director may decide upon a special deadline for registration for this type of assessment.
The University Director can also decide that those who have not been admitted as students should pay an examination fee in order to cover the extra cost to the University in order to carry out such assessments.

§ 10 Education - delegation of authority in accordance with the Act relating to Universities § 44a
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 § 44a subsection 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, cf. the Act relating to Universities § 44a subsection 3.

§ 11 Suspension, exclusion - delegation of authority in accordance with the Act relating to Universities § 42 subsection 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 a continuation of such behaviour will lead to a suspension recommendation being presented to the Board. In cases that are not specifically related to an individual Faculty, this authority rests with the University Director.

The Faculty has the authority to give a written warning to a student that an exclusion recommendation will be presented to the Board that 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 University Director.

Complaints about decisions involving a written warning should be sent to the University Appeals Committee

Chapter 3 Organization of studies

§ 12 The academic year
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.
The Board of NTNU may approve an NTNU programme of study that deviates from the ordinary structure described in §12 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
Programmes of study at NTNU are organized along different lines, in the sense that they:
lead to a Bachelor's degree which subsequently forms the basis for a Master's degree.
result in integrated study progress which eventually may result in a Master's degree or a professional degree
lead to a Master's degree which is based on a completed Bachelor's degree or something that is equivalent.

The Board establishes and closes each programme of studies at NTNU. When the Board creates a new programme of study, it should simultaneously decide which Faculty is to administer the programme.
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.
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 closes old ones. Where an inter-Faculty board has been created for a group of programmes of study, this authority is vested in this board.
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, should contain three introductory courses:
Course 1 of 7.5 credits should be a first semester course common for all students.
Course 2 of 7.5 credits could either consist of courses that are potentially interesting for all groups of students or courses representing a field that differs from those included in the programme of study which the student has gained admission to. This course should primarily be included in the first or second semester.
Course 3 of 7.5 credits is specific for the relevant Faculty. It should be included in the first semester and form a part of the main profile.

§ 14 Programme catalogue and course description
Each programme of study is to be described in a programme catalogue. The Faculty administering the programme of study is to approve the programme catalogue. 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 programme catalogue. The programme catalogue should contain information about possible admission requirements and ranking regulations for the programme of study. The programme catalogue should stipulate:

the teaching objectives and professional objectives of the programme of study

any preliminary knowledge that is recommended to take the programme of study

which Faculty is to administer the programme of study

which courses are included in the programme of study

how many credits the programme of study is worth

what course combination meets the main profile requirements

the structure of the programme of study, whether the programme of study has been divided into years, the fields of study, which are the introductory courses, which are compulsory and optional courses, and the sequence of the courses

the possibilities for student exchanges abroad

other decisions which affect the implementation and quality assurance

transitional arrangements as a result of the introduction of the Quality Reform

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:

teaching objectives

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 towards the course grade

the organization of a possible final examination (how often, when in the semester, date and similar information)

what examination aids 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
The Faculty is to handle applications concerning recognition of external studies or practical experience in accordance with the Act relating to Universities §§ 47, 48 and 49. A condition is that the external education has been approved as education at university or college level.

The Faculty is to handle applications concerning the approval of an equivalent degree or education in accordance with the Act relating to Universities § 48 subsection 2.

§ 16 Exemption from assessment
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 § 49. 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, extent and content.

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
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 programme catalogue defines the requirements of the main profile

introductory courses of 22.5 credits, ref. § 13 subsection 4.

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 main profile of the disciplinary content belongs. If the student has a degree where more than one main profile is included, the student can decide which of the relevant faculties should award the degree.

§ 20 Master's degree
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 programme catalogue for the relevant Master's programme

have fulfilled the other requirements for admission, as specified in the programme catalogue 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.

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 passed relevant studies corresponding to 120 credits, where the programme catalogue may allow 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.

In the Master's programme described in § 20 subsection 2, a Master's thesis corresponding to at least 30 credits, but no more than 60 credits, should be included.

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 § 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 § 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
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 programme catalogue.

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.

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 University Director decides the time of the examination periods. The dates are given in the programme catalogue. The University Director 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 University Director can issue general instructions for
students who are allowed to sit a final examination

invigilators

the presence of course responsable during a written final examination.

These instructions are found in the programme catalogue.

§ 27 Legitimate leave of absence at final examination
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.

A student who is taken ill during a final examination should notify the principal invigilator in the examination hall or the external examinationiner/internal examinationiner at oral examinations. The student subsequently has to see a doctor quickly and submit a medical certificate, as stated in the regulations in § 27 subsection 1.

§ 28 Re-sit examination
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.

Students must register for the re-sit examination within the deadline stated by the Faculty or in the supplementary regulations.

The Faculty can in agreement with the University Director 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.

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
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.

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.

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
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.

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.

If the requirements of the student are permanent, the use of special aids may be allowed throughout his/her studies.

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 University Director. Applications for different forms of assessment from the one given in the course description are to be decided by the University Director in consultation with the Faculty.

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
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.

examination papers written in Norwegian should contain a version in the other form of the 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.

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.

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 § 50 no. 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
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 § 54. The same applies to the recognition of courses, credits or education, as well as exemption from assessment.

In accordance with the Act relating to Universities § 42 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.

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 examinationiners
The Faculty appoints the examinationiners, ref. the Act relating to Universities § 50 subsection 2. The examinationers are appointed for 3 years at a time.

At least two examinationiners 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 examinationiners, of whom at least one should be external, should be present at the assessment of Master's theses, ref. the Act relating to Universities § 50 subsection 2.

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 § 50 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:
Each letter grade is replaced by its equivalent number, A=5, B=4, C=3, D=2, E=1.
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.
This total is subsequently divided by the total number of credits included in all the courses.
The quotient is calculated to one decimal place.
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
Whether or not a final grade is to be given is decided by supplementary regulations.

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 § 40.

§ 42 Explanations and appeals
Cases involving the explanation of grades and complaints about them are to be handled in accordance with the Act relating to Universities § 52. 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 § 52 subsection 3.

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 § 50 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.

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.

Complaints against procedural errors can be submitted in accordance with the Act relating to Universities § 51. The complaint is to be sent to the Faculty. In accordance with § 51 of the Act relating to Universities, 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.

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
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.

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 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 from the academic year 2003/2004.