The exam includes three components, each of which constitutes 1/3 of the final grade.

I. Provide short (e.g., one paragraph) descriptions for each of the following five terms:
   - Hotellings Rule
   - Embedded Autonomy
   - Carried Interest
   - Sliding Scale
   - Internal control

II. Respond to one of the following two essay questions:
   - What role did labour unions play in the development of Norway’s petroleum management regime?
   - Or
   - Is it ethical for Norway to continue pumping oil and gas out of the ground?

III. How will a significant and rapid drop in the price of oil affect an economy like Norway’s, which depends heavily on petroleum? What can a country do to protect against these types of price shocks?
I. Provide short (e.g., one paragraph) descriptions for each of the following five terms:

**Hotelling’s Rule**
Accounting rule that holds that the most socially and economically profitable extraction path of a non-renewable resource is one along which the price of the resource, determined by the marginal net revenue from the sale of the resource, increases at the rate of interest. From Hotelling (1931).

**Embedded Autonomy**
This term originates in the work of Peter Evans (1995) and refers to the complicated relationship between government and non-governmental actors in facilitating economic development. Evans argues that government agencies cannot effectively involve themselves in economic matters without obtaining detailed information from non-governmental actors (they need to be embedded), but these same agencies need to be independent of private interests (autonomous).

**Carried Interest**
When a working interest partner (most usually a NOC) in the exploration or development phase of a contract pays a share of costs and expenses that is disproportionately lower than its working interest share. Typically, NOCs are carried through the exploration phase, at which point the government takes up a working interest (or “backs in”).

**Sliding Scale**
A formula used by the Norwegian government to ensure that the government’s participation share increased with the size of a field’s productive capacity.

**Internal control**
Norwegian control principle introduced in the latter half of the 1970s to the HSE sector to ensure that license holders are held responsible for compliance with the rules and regulations in their activities.

II. Respond to one of the following two essay questions:

**What role did labor unions play in the development of Norway’s petroleum management regime?**

Labor unions played a significant role in the development of Norway’s petroleum management regime: both directly and indirectly. Indirectly, the labor movement supported the Labor Party in government, which was central in establishing the democratic constraints placed on the industry, the tripartite management structure that developed, and the type of NOC that Statoil eventually became. Labor unions, as organized in hierarchical corporatist bargaining institutions (e.g., the LO) also play an important role in the state’s ability to control wage/price developments and the threat of inflation/appreciation (ala the Aukrust model).

Labor unions were also directly involved in the formation and implementation of Norway’s regulatory framework, and they continue to play an active role in many of the internal control fora and institutions that are used to monitor health, safety and environmental regulations, as described in chapter 9. (see box 9.4: e.g., Sikkerhetsforum; Regelverksforum; SfS; RVK; Sektorstyre Petroleumsindustri…)

Good students should be able to draw on both sets of effects (direct and indirect), and relate them to particular institutions in the Norwegian case.

**Is it ethical for Norway to continue pumping oil and gas out of the ground?**
This is obviously a difficult and contentious question, and there are many ways to respond to the question. In doing so, student should consider all the relevant variables, and explain their argument in a balanced and reasoned way.

In the book, we suggested that it was not ethical for Norway to continue, given our growing realization that substantial amounts of petroleum will need to stay in the ground if we are to avoid global warming. If we accept this constraint, the question is: Who should be responsible for the (limited) amount of oil that might legitimately (ethically) brought to market? Given Norway’s wealth, I think an argument can be made that this opportunity should be left to less fortunate members of the global community (e.g., the developing world), but only if this production can be done in a way that protects the surrounding community and environment. In other words, it would not be ethical to stop petroleum extraction in Norway and encourage it in a context which ignores environmental protections and exacerbate social and economic inequalities. But if developing countries can manage the resource in a way that is as environmentally, socially and politically sensitive as the Norwegian authorities have done, ceteris paribus, then the more ethical production would be in the developing world. Absent that capacity to develop the resource in a politically, socially and environmentally sustainable manner, however, then Norwegian production remains ethical.

III. How will a significant and rapid drop in the price of oil affect an economy like Norway’s, which depends heavily on petroleum? What can a country do to protect against these types of price shocks?

There are two parts to the question. The first asks how a price shock works its way through an oil dependent economy. The second asks what can be done to protect against such events.

The price of oil affects an economy like Norway’s in three distinct ways: 1) through its effect on demand for domestic petroleum products/services; 2) through the government’s (petroleum-derived) revenues, and how they are spent; and 3) on the impact on the country’s exchange rate and stock market. In other words, a drop in oil prices, will bring a fall in the country’s exchange rate (depreciation), a fall in domestic production (jobs and investments), and a drop in the government’s revenues (from that oil activity).

To protect against these threats, a country needs: 1) to ensure a diversified economy, so that those that lose jobs in the oil sector (due to the price fall), have other jobs to go to; and so that these other sectors will benefit from the depreciation, in that they become more price-competitive on international markets (due to the depreciation); 2) the country needs a means to insulate the domestic economy from the price shock, and the inflation that usually results from the depreciation effect on the exchange rate. If a country doesn’t have a diversified economy, and relies heavily on imports, the depreciation will make all imports into the country more expensive, driving up inflation/prices. In Norway, corporatist wage polices allow real wage restraint in the wake of a depreciation (ala the Aukrust model), to ensure that exporters are able to maintain their international competitiveness; 3) countries should consider using a stabilization fund, to save up money (when the price of oil is high) that can be used to help pay for a bridging strategy (when the price drops). Such a fund can be designed, like the Norwegian one, to ensure that money from the oil industry trickles into the government at a steady rate (to avoid appreciation, and to smooth out the fickle price changes in oil) and can be used to stimulate the economy in counter-cyclical fashion.