CI9-FM-12 Design Projects

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Other contributors:</td>
<td>TBC</td>
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<tr>
<td>Module status:</td>
<td>Core</td>
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<tr>
<td>Pre- or co-requisites:</td>
<td>CI9-FM-01 to CI9-FM-11</td>
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<tr>
<td>Term:</td>
<td>Spring</td>
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<tr>
<td>Contact hours:</td>
<td>20</td>
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<td>ECTS units:</td>
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<td>FHEQ Level:</td>
<td>7</td>
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<td>Assessment:</td>
<td>Design reports and oral presentations</td>
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### 1.0 Aims

The aims of this module are to:

- Practically apply the taught material from all the modules.
- Gain a wider understanding of engineering design.
- Prepare students for working in industry.

### 2.0 Syllabus

This will consist of 4 one-week design projects focusing on the Fluid Mechanics of:

- Offshore Engineering
- Coastal Engineering
- Environmental Flows
- Built Environment

The students will undertake the projects in teams and submit a design report as well as give an oral presentation on their findings to the client. All groups are expected to address:

- Creative design and engineering solutions
- Cost and value, including the business case
- Constructability
- Risk assessment (financial and legislative) and management
- Health and safety strategy
- Sustainability and environmental impact
- Effective use of materials

Several workshops will be given during the module covering Health & Safety, Risk Assessments, Sustainability and Environmental Impacts. The derivation of Metocean design criteria will also be covered and students will be introduced to software packages such as ANSYS-FLUENT, openFOAM, Delft3D, SWAN and SWASH.
Example projects are given below.

**Offshore: Gravity Based Structure**
In this project students would outline the design of an offshore Gravity Based structure. This will involve understanding the importance of nonlinearity in extreme seas, assessing the applied loading and the dynamic response and determining the sensitivity to the adopted procedures.

**Coastal: Breakwater Design**
In this project students would design a breakwater to protect a harbour from a harsh wave environment. This will involve transforming waves from deep to shallow and performing diffraction calculations for the local wave fields. Consideration of different types of breakwater concepts and their effect on sediment transport will also be key.

**Environmental Flows: Hazard Management Plan**
In this project students would design a hazard management plan for accidental dense gas release from an industrial plant. The process will involve prediction of the gas cloud shape, concentration and subsequent dispersal and assessment of the effects of ambient wind and topography.

**Built Environment: Sustainable Urban Design**
In this project students will design or retrofit a building, focusing particularly on ventilation aspects, air-conditioning and building energy performance.

### 3.0 Intended learning outcomes

On successfully completing this module, students will be able to:

- Be inspired and appreciate the theoretical teaching they receive.
- Learn wider skill sets such as leadership, team working and presentation skills.
- Consider the sustainability and environmental impacts of their concepts.
- Appreciate the importance of ethics and legislation in the role of an Engineer during the design stage.

### 4.0 Teaching methods

The module will be taught using a series of workshops and supervised by academic staff and members of industry.

### 5.0 Assessment

Assessment information will be provided separately.
6.0 Recommended textbooks

Category as defined by Central Library: C = Core, S = Supplementary