# MODULE SPECIFICATION

## MODULE DETAILS

<table>
<thead>
<tr>
<th>Module title</th>
<th>Design of Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>CE613</td>
</tr>
<tr>
<td>Credit value</td>
<td>20</td>
</tr>
<tr>
<td>Level</td>
<td>Level 4</td>
</tr>
</tbody>
</table>

### Entry criteria for registration on this module

#### Pre-requisites
Specify in terms of module codes or equivalent
CE511 and CE512 and CE612 or equivalent

#### Co-requisite modules
Specify in terms of module codes or equivalent
None

### Module delivery

#### Mode of delivery
- Taught  | X |
- Distance | |
- Placement | |
- Online | |
- Other | |

#### Pattern of delivery
- Weekly  | X |
- Block | |
- Other | |

#### When module is delivered
- Semester 1 | |
- Semester 2 | |
- Throughout year  | X |
- Other | |

### Brief description of module content and/or aims

#### Overview (max 80 words)
This module will deepen students understanding about the creative, and complex interdisciplinary nature of the structural design process. A group design project will reinforce, integrate, and further develop earlier learning about the construction materials, analysis (structural, geotechnical and hydraulic), and member design. The project will be underpinned by systematic evaluation of client brief, current industry practice for conceptual, preliminary and detailed design of a concrete structure giving due consideration to the functionality, safety, stability, buildability, and social and economic objectives.

### Module team/author/coordinator(s)
Dr. Muhammad Imran Rafiq

### School
Environment and Technology

### Site/campus where delivered
This module will be normally be delivered at Moulsecoomb Campus

### Course(s) for which module is appropriate and status on that course

<table>
<thead>
<tr>
<th>Course</th>
<th>Status (mandatory/ compulsory/ optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEng (Hons) Civil Engineering</td>
<td>Compulsory</td>
</tr>
<tr>
<td>BEng (Hons) Civil Engineering (Degree Apprenticeship)</td>
<td>Compulsory</td>
</tr>
<tr>
<td>BEng (Hons) Civil Engineering with Integrated Foundation Year</td>
<td>Compulsory</td>
</tr>
<tr>
<td>MEng Civil Engineering with Integrated Foundation Year</td>
<td>Compulsory</td>
</tr>
<tr>
<td>BEng (Hons) Civil Engineering with Construction Management</td>
<td>Compulsory</td>
</tr>
</tbody>
</table>

Module descriptor template: updated Aug 2014
<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEng (Hons) Civil with Environmental Engineering</td>
<td>Optional</td>
</tr>
<tr>
<td>MEng (Hons) Civil Engineering</td>
<td>Compulsory</td>
</tr>
<tr>
<td>MEng (Hons) Civil Engineering with Construction Management</td>
<td>Compulsory</td>
</tr>
<tr>
<td>MEng (Hons) Civil with Environmental Engineering</td>
<td>Compulsory</td>
</tr>
</tbody>
</table>

### MODULE AIMS, ASSESSMENT AND SUPPORT

#### Aims

The module aims to:

- deepen student’s understanding about the creative and complex interdisciplinary nature of the structural design process;
- enable students to utilise industry best practice guidelines and codes of practice for the design and construction of structures;
- enhance and extend the students ability to design a structural system, underpinned by critical appraisal of clients brief and other considerations such as functionality, safety and stability, buildability, and social and economic objectives.

#### Learning outcomes

On successful completion of the module the student will be able to:

**LO1.** develop and appraise alternative structural design solutions through systematic evaluation of clients brief, giving due considerations to the functionality, buildability, and sustainability;

**LO2.** utilise the industry best practice guidelines and codes of practice for the loading, analysis and detailed design of structures;

**LO3.** evaluate the safety, and stability of structural systems against vertical and lateral loads using a combination of computer aided and hand based techniques;

**LO4.** undertake detailed design of a typical single / multi-storey structure and their connections.

**LO5.** prepare structural drawings, design calculations, construction methodology, and estimate the cost of material and construction.

#### Content

- Overview of structural design process, including conceptual, preliminary and detailed design.
- Overview of current industry guidelines;
  - Building regulations, and approved documents.
  - CDM regulations
  - Planning issues and site conditions.
- Structural safety and stability to vertical and lateral loads
  - Structural systems in Concrete
  - Robustness of structures
- Codes of Practice for the design of structures (EC0, EC1 and EC2)
  - Serviceability and Ultimate limit states
  - Preliminary sizing of concrete structures
  - Loading on structures, and load combinations
  - Design of moment resisting frames
  - Design of shear and core walls
  - Design of two-way slab
  - Design of continuous beams and slabs
  - Design of beams for shear and torsion
  - Design of slender columns, and columns subjected to bi-axial bending.
- Introduction to prestressed concrete design
### Prestressing systems
- Analysis of prestressed concrete members
- Design of prestressed concrete members

#### Learning support
Latest edition of the following texts:

**Recommended Books:**

**Industry guidelines and Codes of Practice:**
- Approved documents collection, 2016, part of building regulations, available at planning portal website.
- Eurocodes and National Annex available online at British Standards Online (BSOL) website

**Key Websites:**
- [http://bsol.bsigroup.com](http://bsol.bsigroup.com). Also accessible through university
library resources a-z.
http://libguides.brighton.ac.uk/az.php?a=b
- www.planningportal.co.uk
- Construction Information Service (CIS) database accessible through Library resources a-z.
http://libguides.brighton.ac.uk/az.php?a=c
- www.ciria.org
- https://www.brighton-hove.gov.uk/content/planning

University Disability Service

The University’s Disability Service is responsible for supporting students with disabilities and dyslexia to gain individual support, and for liaising with other university departments in relation to access to buildings, teaching and assessments on the students’ behalf.

### Teaching and learning activities

**Details of teaching and learning activities**

The teaching and learning activities are centred on project based learning; supported throughout with lectures, tutorials, facilitated group discussions, and workshops. Group discussions outside contact time (within studentcentral) will encourage effective communication within each group. Some activities will be designed in consultation with students during facilitated group discussions to ensure support in relation to their needs.

- **Lectures**: 28 Hours
- **Tutorials**: 11 Hours
- **Facilitated group discussions**: 10 Hours
- **Computer aided analysis, and sketching workshop**: 6 Hours

Two formative assessments, regular individual group discussions with tutors, and feedback on tutorials will enable students to gain appropriate feedback throughout various design stages. Each group will develop a process for the design project during the first formative task, including identification and allocation of tasks to individuals. Feedback will be given during the facilitated group discussions, and will ensure that individuals are able to demonstrate required learning outcomes.

Peer assessment of the design report (second formative assessment) will be arranged during a tutorial session that will provide the students with the feedback on their analysis and design. They will also gain confidence in reviewing others work, and will learn alternative approaches used by different groups.

<table>
<thead>
<tr>
<th>Allocation of study hours (indicative)</th>
<th>Study hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where 10 credits = 100 learning hours</td>
<td></td>
</tr>
<tr>
<td><strong>SCHEDULED</strong></td>
<td>This is an indication of the number of hours students can expect to</td>
</tr>
</tbody>
</table>

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spend in scheduled teaching activities including lectures, seminars, tutorials, project supervision, demonstrations, practical classes and workshops, supervised time in workshops/ studios, fieldwork, and external visits.

**GUIDED INDEPENDENT STUDY**
All students are expected to undertake guided independent study which includes wider reading/ practice, follow-up work, the completion of assessment tasks, and revisions.

**PLACEMENT**
The placement is a specific type of learning away from the University. It includes work-based learning and study that occurs overseas.

**TOTAL STUDY HOURS** 200

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**Assessment tasks**

**Details of assessment on this module**

Students will work in groups to develop conceptual, preliminary and detailed engineering design of a concrete framed structure to comply with client’s brief, relevant industry guidelines, and codes of practice.

The group design project (100% coursework for CAMS) consists of two components: a critique of conceptual design alternatives, and a design project report. Individual student’s effort is expected to be approx. 35 hours on the design project work.

The weighting of the two components within the design project is as follows:

a) Critique of conceptual design alternatives (LO1, LO3) in the form of a group presentation (equivalent to 5 min. per student) OR a group Poster OR group report (approx. 10 hours per student effort) = 20%;

b) Detailed design group report (LO2 - LO5), 25 hours per student effort = 80%.

The performance of individual students will be assessed through the extent and quality of their contributions within the design project. An overall mark of 40% will be required by an individual to pass the module.

**Types of assessment task**

<table>
<thead>
<tr>
<th>Indicative list of summative assessment tasks which lead to the award of credit or which are required for progression.</th>
<th>% weighting (or indicate if component is pass/fail)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WRITTEN</strong> Written exam</td>
<td></td>
</tr>
<tr>
<td><strong>COURSEWORK</strong> Written assignment/ essay, report, dissertation, portfolio, project output, set exercise</td>
<td>80</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong> Oral assessment and presentation, practical skills assessment, set exercise</td>
<td>20</td>
</tr>
</tbody>
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1 Set exercises, which assess the application of knowledge or analytical, problem-solving or evaluative skills, are included under the type of assessment most appropriate to the particular task.

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**EXAMINATION INFORMATION**

| Area examination board | Built Environment and Civil Engineering |

Refer to University for guidance in completing the following sections

**External examiners**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and institution</th>
<th>Date appointed</th>
<th>Date tenure ends</th>
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</thead>
<tbody>
<tr>
<td>Dr S Mitchell</td>
<td>Senior Lecturer, University of Portsmouth</td>
<td>01/10/2017</td>
<td>30/09/2021</td>
</tr>
<tr>
<td>Dr C Malaga-Chuquitaype</td>
<td>Lecturer, Imperial College London</td>
<td>01/10/2017</td>
<td>30/09/2021</td>
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**QUALITY ASSURANCE**

<table>
<thead>
<tr>
<th>Date of first approval</th>
<th>July 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of last revision</td>
<td>Q&amp;S Editorial change August 2019</td>
</tr>
<tr>
<td>Date of approval for this version</td>
<td>Editorial change Dec 2019</td>
</tr>
<tr>
<td>Version number</td>
<td>3.2</td>
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<tr>
<td>Modules replaced</td>
<td>CN312</td>
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Available as free-standing module? | Yes | No | X