**Short Form Module Details**

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| **Module Title** | Design and Construction |
| **Level** | 5 |
| **Reference No.*****(showing level)*** | EUC\_5\_417 |
| **Credit Value** | 30 |
| **Student Study Hours** | Contact hours: Student managed learning hours: Total hours:  | 78 222   300                         |
| **Pre-requisite learning** |  |
| **Co-requisites** |  |
| **Excluded combinations** |  |
| **Module Leader** | Dr. Chee Seong Chin |
| **Faculty/Department** | ESBE / Urban Engineering |
| **Short Description** | This module offers the knowledge and skills of reinforced concrete and steel design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions. The module is geared to students studying on the BEng (Hons) degree in Civil Engineering. |
| **Aims** | * To introduce students to the design of reinforced concrete and steel sections in accordance with appropriate Eurocodes.
* To make them aware of the need for durability, stability, robustness and fitness for purpose and to familiarise them with the process for selecting structural form and materials for civil and building structures.
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| **Learning Outcomes** | **Knowledge and Understanding**:The student should be able to:* Understand the principles of limit state, design and the influence of material behaviour.
* Interpret rules from Eurocodes into reinforced concrete and steel design.
* Recognise combination of actions, load paths and take down structural loading.
* Design reinforced concrete and steel structures.
* Use computer software for structural analysis and design.

**Intellectual Skills**:* Apply engineering knowledge and understanding in the solution of problems and the development of designs.

**Practical Skills**:* Able to make planning, initial design decisions and to ‘size’ elemental structural members.
* Design reinforced concrete and steel structural elements.
* Principle of concrete and steel structure systems.

**Transferable Skills**:* Communicate design ideas by using annotated drawings and digital representation is to be fostered.
* Manage time and work to deadlines.
* Work constructively as a member of a group.
* Study independently and use library resources.

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| **Employability** | This module will provide the students with a knowledge and understanding of reinforced concrete and steelwork design, which is of vital importance in the field of civil and structural engineering. This will enable the student to gain important design skills that are essential for the student’s future work either in construction or engineering consulting industry as well as organisations and agencies in which civil or structural engineers may be employed. |
| **Teaching and learning pattern** | Lectures supplemented by printed handouts, design guides and worked examples. The lectures are complemented by laboratory and computer sessions, as well as seminars and project work with peer critique sessions. Tutorial classes will be taught concurrently with lecture hours to help with the understanding of design and project work.  |
| Lectures and tutorials:Computing lab:**Total Contact hours:**Coursework 1:Coursework 2:Private study:**Student managed learning hours:****Total learning time:**  | 6612**78**2020182**222****300** |
| **Indicative content** | **Reinforced Concrete Design:*** The Principle of Limit State Design.
* Definition and Combination of Actions.
* Assessment of Structures Loads (Dead, Imposed and Wind).
* Reinforced Concrete as a Composite Material.
* Concrete Production and Mix Design.
* Analysis of Reinforced Concrete Section.
* Design of Reinforced Concrete Beam.
* Reinforced Concrete Slab Design.
* Ultimate Shear Capacity of Reinforced Sections.
* Design of Reinforced Concrete Column.

**Steelwork Design:*** Introduction to the Design Process, Objectives Decisions and Philosophies Applied to Steel Structures.
* Construction of Steel Structures.
* Classification of Steel Sections.
* Steel Section Tables, Capacity Data for Bolts and Fillet Welds.
* Stability and Loadings on Steel Structures.
* Tension and Compression Members.
* Fully-Restrained and Unrestrained Beams.
* Lateral Torsional Buckling. Equivalent Slenderness. Buckling Parameter. Torsional Index. Moment Capacity.
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| **Assessment*****Elements & weightings*** | 70% 3 hour end of module written examination15% Coursework 1 – Reinforced Concrete Design15% Coursework 2 – Steelwork Design |
| **Indicative Sources*****(Reading lists)*** | **Core*** + Mosley, B., Bungey, J. and Hulse, R. (2007). “Reinforced Concrete Design to Eurocode 2”, Palgrave, Macmillan.
	+ IStructE (2006). "Manual for the Design of Concrete Building Structures to Eurocode”, The Institution of Structural Engineers.
* The Steel Construction Institute (2005). “Steel Designers' Manual”, 6th Edition, Wiley-Blackwell.
	+ Eurocode 0 (2002). “Basis of Structural Design”, BS EN 1990:2002,British Standard Institution.
	+ Eurocode 1 (2002). “Actions on Structures, Part 1-1: General actions – Densities, Self-Weight, Imposed Loads for Buildings”, BS EN 1991-1-1:2002, British Standard Institution.
	+ Eurocode 2 (2004). “Design of Concrete Structures – General Rules and Rules for Buildings”, BS EN 1992-1-1:2004, British Standard Institution.
	+ Eurocode 3 (2005). “Design of steel structures – General Rules and Rules for Buildings, BS EN 1993-1-1, British Standard Institution.

**Optional** * Arya, Ch. (2009). "Design of Structural Elements", Chapman and Hall.
* Draycott, T. and Bullman, P. “Structural Elements Design Manual Working with Eurocodes”, Elsevier, 2009.
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