The Hong Kong Polytechnic University
Hong Kong Community College

Subject Description Form

Subject Code	CCN2333
Subject Title	Structural Mechanics Fundamentals
Level	2
Credit Value	3
Medium of Instruction	English
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject aims to provide students with fundamental concepts in structural mechanics. Emphasis is placed on the development of students' ability to analyse statically determinate trusses, beams and frames. The subject also helps students to build up a good foundation for further studying civil engineering-related subjects.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) identify internal forces in beams and frames to develop shear force and bending moment diagrams. (b) use appropriate method to solve structural problems in trusses. (c) solve bending and shear stresses in simple structures. (d) comprehend the importance of stress and strain in different structural forms. (e) determine the design loads and the load paths for common structural forms.
Subject Synopsis/ Indicative Syllabus	**Statically Determinate Simple Structures** Simple trusses: equilibrium, support reactions, determination of forces in the structural members using the method of joints and method of sections; Beams and 2-D frames: shear force and bending moment diagrams, internal forces, relationships between load, shear force and bending moment. **Mechanical Properties of Materials** Normal and shear stresses; Normal and shear strains; Elastic properties of materials; Tensile tests; Strain energy in tension and compression;

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Stresses in Beams
The first and second moments of area; Bending and shear stresses in beams; Strain energy in bending and shear.

2D Stress and Strain
Plane Stress; Principle Stresses and maximum shear stresses; Plane strain; Analysis of strain.

Load Paths
Types of structural load; Load distribution and load paths in simple structures; Structural forms.

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<tr><td>Teaching/Learning Methodology</td><td>Lectures will deliver the fundamental knowledge of structural mechanics to students. Tutorials will provide students with the opportunity to deepen their understanding of the lecture materials through solving real-life problems. Activities in tutorials will normally include discussion on problems.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>

A variety of assessment tools will be used to develop and assess students' achievement of the subject intended learning outcomes.

<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="5">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td></tr>
<tr><td>Continuous Assessment*</td><td>40</td><td colspan="5"></td></tr>
<tr><td>▪ Test</td><td>16</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>▪ Assignment 1</td><td>12</td><td>✓</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>▪ Assignment 2</td><td>12</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Final Examination</td><td>60</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="5"></td></tr>
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**Continuous assessment items and/or weighting may be adjusted by the subject team subject to the approval of the College Programme Committee.*

To pass this subject, students are required to obtain Grade D or above in **both** the Continuous Assessment and Final Examination.

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<tr><td>Student Study Effort Expected</td><td>

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<tr><td>Class contact</td><td>Hours</td></tr>
<tr><td>▪ Lecture</td><td>26</td></tr>
<tr><td>▪ Tutorial</td><td>13</td></tr>
<tr><td>Other student study effort</td><td></td></tr>
<tr><td>▪ Self-study to preview and review lectures' materials</td><td>52</td></tr>
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	▪ Coursework	39
	Total student study effort	**130**
Reading List and References	**Recommended Textbooks** Hibbeler, R. C. (2018). *Mechanics of Materials*. (10th ed.), Pearson. Hibbeler, R. C. (2018). *Structural Analysis*. (10th ed.), Pearson. **References** Connor, J. J. & Faraji, S. (2016). *Fundamentals of Structural Engineering.* Springer. Hulse, R. & Cain, Jack (2000). *Structural Mechanics* (2nd ed.), Palgrave. Goodno, B. J. & Gere J. M. (2018). *Mechanics of Materials*. (9th ed.), Cengage Learning. Gahlot, P.S & Gehlot, Deep (2012). *Fundamentals of Structural Mechanics.* (2nd ed.), CBS Publisher & Distributors. Beer, F. P., Johnston, E. R., DeWolf, J. T. & Mazurek, D. F. (2011). *Statics and Mechanics of Materials*. (1st ed.), McGraw-Hill.	