

# CVEN30009 Structural Theory and Design

<b>Credit Points:</b>	12.5									
<b>Level:</b>	3 (Undergraduate)									
<b>Dates &amp; Locations:</b>	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.									
<b>Time Commitment:</b>	Contact Hours: 49 hours (Lectures: 36 hours per semester; Laboratory/Tutorial/Design workshops: 13 hours per semester) Total Time Commitment: 170 hours									
<b>Prerequisites:</b>	<p>Successful completion of BOTH of the following subjects is required to enrol:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>ENGR20004 Engineering Mechanics</td> <td>Summer Term, Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>ENGR20003 Engineering Materials</td> <td>Semester 2</td> <td>12.50</td> </tr> </tbody> </table> <p>Note: ENGR20003 Engineering Materials may be taken concurrently OR Admission to the MC-ENG Master of Engineering</p>	Subject	Study Period Commencement:	Credit Points:	ENGR20004 Engineering Mechanics	Summer Term, Semester 1, Semester 2	12.50	ENGR20003 Engineering Materials	Semester 2	12.50
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ENGR20004 Engineering Mechanics	Summer Term, Semester 1, Semester 2	12.50								
ENGR20003 Engineering Materials	Semester 2	12.50								
<b>Corequisites:</b>	None									
<b>Recommended Background Knowledge:</b>	None									
<b>Non Allowed Subjects:</b>	None									
<b>Core Participation Requirements:</b>	<p>&lt;p&gt;For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.&lt;/p&gt; &lt;p&gt;It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: &lt;a href="http://services.unimelb.edu.au/disability"&gt;http://services.unimelb.edu.au/disability&lt;/a&gt;&lt;/p&gt;</p>									
<b>Coordinator:</b>	Assoc Prof Tuan Ngo									
<b>Contact:</b>	<p>Dr Tuan Ngo <a href="mailto:dtngo@unimelb.edu.au">dtngo@unimelb.edu.au</a> (<a href="mailto:dtngo@unimelb.edu.au">mailto:dtngo@unimelb.edu.au</a>)</p> <p>Dr Elisa Lumantarna <a href="mailto:elu@unimelb.edu.au">elu@unimelb.edu.au</a> (<a href="mailto:elu@unimelb.edu.au">mailto:elu@unimelb.edu.au</a>)</p>									
<b>Subject Overview:</b>	<p><b>AIMS</b> This subject introduces the basic methods of structural analysis and the design of simple structures which are built of reinforced concrete, steel, timber and masonry. A feature of this subject is the integration of the design and analytical skills in dealing with contemporary structures that have an effective blending of materials for achieving satisfactory performance and economy in construction. This subject consolidates basic structural theory and design abilities that underpin further specialised studies in structural design in engineering masters programs. It also gives students some basic capabilities to seek work experience in the engineering profession.</p> <p><b>INDICATIVE CONTENT</b></p>									

	Topics covered include: stress analysis in beams, deflection calculations using direct integration and virtual work methods, structural analyses of beams and frames by the force method, structural design of reinforced concrete beams and columns, structural design of steel beams, columns and ties, design of timber joists and masonry squat walls.
<b>Learning Outcomes:</b>	<p><b>INTENDED LEARNING OUTCOMES (ILO)</b> On completion of this subject the student is expected to:</p> <ol style="list-style-type: none"> <li>1 Analyse stresses in beams due to combined axial, bending and torsional loads</li> <li>2 Calculate deflections in beams by numerical integration methods and unit load method</li> <li>3 Calculate deflections in frames by unit load method</li> <li>4 Conduct stability analysis of simple systems including the buckling of columns and stress amplifications</li> <li>5 Analyse using the force method for solving indeterminate systems of beams and frames</li> <li>6 Design steel beams, columns and ties</li> <li>7 Design reinforced concrete one-way slabs, simple beams and compression-only columns, and basic detailing</li> <li>8 Design timber joists and masonry squat walls</li> <li>9 Design simple structural systems taking into account the design load cases.</li> </ol>
<b>Assessment:</b>	One 1000 word design assignment (10%) (per student) in groups of 3 students, requiring approximately 10-13 hours of work, due Week 8. Intended Learning Outcomes (ILOs) 2, 4, 6, 7 and 9 are addressed in this assignment Four x 250 word laboratory reports (5% each, total of 20%) (per student) to be completed in groups of 3 students, due throughout the semester, each lab report requiring approximately 5 hours of work. ILOs 1, 2, 5 and 7 are addressed in the four laboratory reports One 3 hour examination (70%) end of semester. ILOs 1 to 8 are addressed in the examination
<b>Prescribed Texts:</b>	None
<b>Breadth Options:</b>	<p>This subject potentially can be taken as a breadth subject component for the following courses:</p> <ul style="list-style-type: none"> <li># <b>Bachelor of Arts</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-ARTS">https://handbook.unimelb.edu.au/view/2016/B-ARTS</a>)</li> <li># <b>Bachelor of Commerce</b> (<a href="https://handbook.unimelb.edu.au/view/2016/B-COM">https://handbook.unimelb.edu.au/view/2016/B-COM</a>)</li> </ul> <p>You should visit <b>learn more about breadth subjects</b> (<a href="http://breadth.unimelb.edu.au/breadth/info/index.html">http://breadth.unimelb.edu.au/breadth/info/index.html</a>) and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.</p>
<b>Fees Information:</b>	Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>
<b>Generic Skills:</b>	<p>Students successfully completing this subject should develop the following general skills:</p> <ul style="list-style-type: none"> <li># Ability to apply knowledge of science and engineering fundamentals</li> <li># Ability to undertake problem identification, formulation, and solution</li> <li># Ability to utilise a systems approach to complex problems and to design and operational performance</li> <li># Proficiency in engineering design</li> <li># Ability to conduct an engineering project</li> <li># Ability to communicate effectively, with the engineering team and with the community at large</li> <li># Ability to manage information and documentation</li> <li># Capacity for creativity and innovation</li> <li># Understanding of professional and ethical responsibilities, and commitment to them</li> <li># Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member</li> <li># Capacity for lifelong learning and professional development.</li> </ul>
<b>Notes:</b>	<p><b>LEARNING AND TEACHING METHODS</b> The subject will be delivered through a combination of lectures and tutorials. In addition, students will undertake miniature experiments to reinforce materials covered in the lectures and also a design exercise which involves applying the learnt techniques in solving problems that are likely to be encountered in practice.</p>

	<p><b>INDICATIVE KEY LEARNING RESOURCES</b> Students will have access to lecture slides, recommended reading materials. The subject LMS site also contain worked solutions for all tutorial problems.</p> <p><b>CAREERS / INDUSTRY LINKS</b> Senior practising engineers from industry will deliver some of the lectures and case studies with focus on typical industry design considerations. Having completed this unit, students will acquire skills to design and analyse simple structures.</p>
<b>Related Course(s):</b>	Master of Architectural Engineering
<b>Related Majors/Minors/ Specialisations:</b>	<p>B-ENG Civil Engineering stream Civil (Engineering) Systems major Civil Systems Engineering Systems Environments Discipline subjects Master of Engineering (Civil with Business) Master of Engineering (Civil) Master of Engineering (Structural) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED</p>