

# MCEN30020 Systems Modelling and Analysis

<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: 60 hours (3 hours of lectures and a 2 hour workshop each week) Total Time Commitment: Expected 170 hours											
<b>Prerequisites:</b>	<b><u>ENGR20004 Engineering Mechanics</u></b> ( <a href="#">../view/2016/ENGR20004</a> ) PLUS <b><u>MAST20029 Engineering Mathematics</u></b> ( <a href="#">../view/2016/MAST20029</a> ) OR <b><u>MAST20009 Vector Calculus</u></b> ( <a href="#">../view/2016/MAST20009</a> ) AND <b><u>MAST20030 Differential Equations</u></b> ( <a href="#">../view/2016/MAST20030</a> )											
<b>Corequisites:</b>	None											
<b>Recommended Background Knowledge:</b>	<table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>ELEN20005 Foundations of Electrical Networks</td> <td>January, Semester 2</td> <td>12.5</td> </tr> </tbody> </table>			Subject	Study Period Commencement:	Credit Points:	ELEN20005 Foundations of Electrical Networks	January, Semester 2	12.5			
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<b>Non Allowed Subjects:</b>	<table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>ELEN30012 Signals and Systems</td> <td>Semester 2</td> <td>12.5</td> </tr> <tr> <td>BMEN30006 Circuits and Systems</td> <td>Semester 1</td> <td>12.5</td> </tr> </tbody> </table>			Subject	Study Period Commencement:	Credit Points:	ELEN30012 Signals and Systems	Semester 2	12.5	BMEN30006 Circuits and Systems	Semester 1	12.5
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<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>	Prof Chris Manzie											
<b>Contact:</b>	Chris Manzie manziec@unimelb.edu.au											
<b>Subject Overview:</b>	<p>This subject will cover the modelling of a range of physical systems across multiple domains as ordinary differential equations, and then introduce the mathematical techniques to analyse their open loop behaviour.</p> <p>Topics include:</p> <ul style="list-style-type: none"> <li># Development of low order models of a range of electrical, thermal, mechanical, pneumatic and hydraulic dynamic systems</li> <li># Different representations of these systems (time and, frequency domains) and transformations between them (Laplace, Fourier and Z-transforms)</li> </ul>											

	<ul style="list-style-type: none"> <li># Representations of systems – transfer functions, Bode plots, state space, block diagrams, etc</li> <li># Identification of linear time invariant systems (least squares identification)</li> <li># Relation to time domain properties of open loop responses – stability, oscillations, etc.</li> </ul> <p>MATLAB will be used throughout the course to complement the presented concepts.</p>
<b>Learning Outcomes:</b>	<p>Having completed this subject it is expected that the student be able to:</p> <ol style="list-style-type: none"> <li>1 Apply fundamental mathematical tools to model, analyse and design signals and systems in both time-domain and frequency-domain</li> <li>2 Recognise the broad applicability of the mathematics of signals and systems theory, particularly within mechanical and mechatronic engineering</li> <li>3 Identify the parameters of linear time invariant systems using input-output data</li> <li>4 Use MATLAB to study the behaviour of signals and systems as they arise in a variety of contexts.</li> </ol>
<b>Assessment:</b>	<p>One written 3 hour end of semester closed book examination (60%). ILOs 1 to 3 are addressed in the exam. The examination is a hurdle and must be passed to pass the subject. Attendance and participation in three laboratory classes each with written assignment/s, up to 30 pages in total, approximately 30 to 35 hours work (30%). ILOs 1 to 4 are addressed in these laboratories. One mid semester exam no more than 1 hour in week 7 (10%). ILOs 1 to 3 are addressed in this exam.</p>
<b>Prescribed Texts:</b>	None
<b>Breadth Options:</b>	This subject is not available as a breadth subject.
<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>On completion of this subject, students should have developed the following skills:</p> <ul style="list-style-type: none"> <li># The ability to apply knowledge of science and engineering fundamentals</li> <li># The ability to undertake problem identification, formulation, and solution</li> <li># The ability to utilise a systems approach to complex problems and to design and operational performance</li> <li># The ability to undertake problem identification, formulation, and solution.</li> </ul>
<b>Related Majors/Minors/Specialisations:</b>	<p>B-ENG Mechanical Engineering stream  Master of Engineering (Mechanical with Business)  Master of Engineering (Mechanical)  Master of Engineering (Mechatronics)  Mechanical Systems  Mechatronics Systems  Science-credited subjects - new generation B-SCI and B-ENG.  Selective subjects for B-BMED</p>