

BMEN90012 Soft Matter Engineering

Credit Points:	12.50																		
Level:	9 (Graduate/Postgraduate)																		
Dates & Locations:	This subject is not offered in 2013.																		
Time Commitment:	Contact Hours: 3 x one hour lectures + 1 x one hour tutorial per week Total Time Commitment: Estimated 120 Hours																		
Prerequisites:	<p>Students must have completed ONE OF the following subjects (or equivalent) prior to enrolling in this subject:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>CHEM20018 Chemistry: Reactions and Synthesis</td> <td>Not offered 2013</td> <td>12.50</td> </tr> <tr> <td>BMEN30007 Biocellular Systems Engineering</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table> <p>As well as ONE OF the following subjects:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST20029 Engineering Mathematics</td> <td>Not offered 2013</td> <td>12.50</td> </tr> <tr> <td>MAST20009 Vector Calculus</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table>	Subject	Study Period Commencement:	Credit Points:	CHEM20018 Chemistry: Reactions and Synthesis	Not offered 2013	12.50	BMEN30007 Biocellular Systems Engineering	Not offered 2013	12.50	Subject	Study Period Commencement:	Credit Points:	MAST20029 Engineering Mathematics	Not offered 2013	12.50	MAST20009 Vector Calculus	Not offered 2013	12.50
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MAST20029 Engineering Mathematics	Not offered 2013	12.50																	
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Corequisites:	None																		
Recommended Background Knowledge:	None																		
Non Allowed Subjects:	BIEN30001 Bionanoengineering																		
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/																		
Contact:	Email: davided@unimelb.edu.au (mailto:davided@unimelb.edu.au)																		
Subject Overview:	<p>Introduction to soft condensed matter: range of applications and products including foods, cosmetics, pharmaceuticals, ceramics, suspensions, minerals and detergents. The course covers the fundamental structure-function and material properties of these complex systems.</p> <p>The colloidal domain: brownian motion and the Stokes-Einstein equation. Suspension viscosity.</p> <p>Interparticle forces: dispersion forces, electrostatic forces (Poisson-Boltzmann), double layer theory and solvation forces. The role of surface forces in colloidal stability.</p> <p>Electrokinetic characterization of nano-particles and the relationship to colloidal stability and suspension rheology.</p> <p>Suspension rheology, measurement, viscoelasticity and the colloidal state.</p> <p>Polymer physics. Polymers as random walks, ideal and real chains scaling concepts and the size of the random walk.</p> <p>Entropy and Elasticity, the Hookean spring. Viscoelastic behaviour of polymer solutions and melts. Gels, sols and gelation including the concept of percolation. The theory of rubber elasticity.</p>																		

	<p>Adsorption of polymers to surfaces.</p> <p>Surfactants and self assembly. Micelles, vesicles and hexagonal phases. Aggregation numbers and packing parameters. Lipid bilayers.</p> <p>A review of several papers in biotechnology and nanotechnology.</p>
Objectives:	<p>On completion of this course students should be able to:</p> <ul style="list-style-type: none"> # Describe and analyse the flow behaviour of particulate materials and the influence of surface chemistry, additives and processing history on the behaviour of fine solid and liquid particle slurries # Apply the physical concepts to product formulation with required material attributes # Apply the physical concepts to processes in the minerals, ceramics, pigment, food and pharmaceuticals industries # Apply these concepts to the manufacture and characteristics of ceramic, cemented and geopolymerised materials and a range of plastic and filled plastic materials
Assessment:	<p>One written 3-hour end-of-semester examination (80%) One assignment of at least 3000 words (not including appendices and diagrams and tables) due in the second half of the semester (20%) A grade of greater than 50% in the exam is required to pass the subject</p>
Prescribed Texts:	Larson R.G. The Structure and Rheology of Complex Fluids, Oxford University Press, NY 1999
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	<p>The subject will enhance the following generic skills:</p> <ul style="list-style-type: none"> # Ability to apply fundamental science and engineering knowledge # Capacity for independent thought # Ability to analyse and solve open-ended problems # Ability to comprehend complex concepts and communicate lucidly this understanding # Awareness of advanced technologies in the discipline # Ability to work in a team (practical work component) # Ability to write a technical report
Related Course(s):	<p>Master of Biomedical Engineering</p> <p>Master of Philosophy - Engineering</p> <p>Ph.D.- Engineering</p>
Related Majors/Minors/Specialisations:	<p>B-ENG Chemical Engineering stream</p> <p>B-ENG Chemical and Biomolecular Engineering stream</p> <p>Master of Engineering (Biomedical)</p> <p>Master of Engineering (Biomolecular)</p> <p>Master of Engineering (Chemical)</p>