BMEN90012 Bionano Engineering

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 34 hours of lectures; 6 hours of tutorials and 8 hours of practical demonstrations Total Time Commitment: Estimated 120 Hours
Prerequisites:	# 431-202 Engineering Analysis B or equivalent # 411-257 Chemical Process Analysis 2 # 610-283 Reactions and Synthesis
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	411-391 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/
Coordinator:	Prof David Dunstan
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Subject Overview:	Nanotechnology and bionanotechnology, history and definition, fine particle fluids, coloidal dispersions and emulsions. The role of surfaces in processing and materials manufacture. Coagulation, electrokinetics, nano-particle dispersion and stability criterion. Inter-particle forces and parameters that influence flow and gelation properties. The role of molecular additives in controlling inter-particle forces and stability. Nano-particle characterisation using light scattering. Solution properties of polymers, macromolecules, self assembly surfactants, lipids, proteins and polysaccharides. The role of self assembly in the formation of structured nano and biomaterials. Cell assembly and molecular components. Nano-particle formation through precipitation. Surface layer structure, functionionalisation and biocompatibility of nano-particles for pharmaceutical, drug delivery biossay, biosensor and immunology applications. Safety and ethical issues in bionanotechnology.
Objectives:	On completion of this course students should be able to: # Describe and analyse the flow behavious of particulate materials and the influence of surface chemistry, additives and processing history on the behavious of fine solid and liquid particle slurries.

	# Apply the physical concepts to product formulation with required material attributes # Apply the physical concepts to proceses in the minerals, ceremics, 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:	One 3-hour examination contributing 60% of the final assessmentTwo assignments each of up to the equivalent of 4000 words contributing 40% of the assessment
Prescribed Texts:	Larson R.G. The Structure and Rheology of Complex Fluids
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:	The subject will enhance the following generic skills: # 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).
Related Course(s):	Master of Biomedical Engineering