# BIEN30001 Bionanoengineering

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| **Credit Points:** | 12.50 |
| **Level:** | 3 (Undergraduate) |
| **Dates & Locations:** | 2012, Parkville<br>This subject commences in the following study period/s:<br>Semester 2, Parkville - Taught on campus. |
| **Time Commitment:** | Contact Hours: 3 x one hour lectures per week + 1 x one hour tutorial per week Total Time Commitment: Estimated 120 Hours |
| **Prerequisites:** | Students must have completed the following subject prior to enrolling in this subject: |

| Subject | Study Period Commencement: | Credit Points: |
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| CHEM20018 Reactions and Synthesis | Semester 1 | 12.50 |

As well as ONE OF the following subjects:

| Subject | Study Period Commencement: | Credit Points: |
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| MAST20029 Engineering Mathematics | Summer Term, Semester 1, Semester 2 | 12.50 |
| MAST20009 Vector Calculus | Semester 1, Semester 2 | 12.50 |

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| **Corequisites:** | None |
| **Recommended Background Knowledge:** | None |
| **Non Allowed Subjects:** | |

| Subject | Study Period Commencement: | Credit Points: |
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| BMEN90012 Bionanoengineering | Semester 2 | 12.50 |

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| **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 |
| **Contact:** | Email:**davided@unimelb.edu.au (mailto:davided@unimelb.edu.au)** |
| **Subject Overview:** | Nanotechnology and bionanotechnology, history and definition, fine particle fluids, colloidal 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. 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. Nano-particle formation through precipitation. |

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| **Objectives:** | On completion of this course students should be able to:<br># Describe and analyse the flow behavious of particulate materials and the influence of surface chemistry, additives and processing history on the behaviour of fine solid and liquid particle slurries<br># Apply the physical concepts to product formulation with required material attributes<br># Apply the physical concepts to proceses in the minerals, ceremics, pigment, food and pharmaceuticals industries<br># 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 written 3-hour end-of-semester examination (80%) One assignment of up to 5000 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 |
| **Prescribed Texts:** | Larson R.G. The Structure and Rheology of Complex Fluids, Oxford University Press, NY 1999 |
| **Breadth Options:** | This subject potentially can be taken as a breadth subject component for the following courses:<br># **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2012/B-ARTS)**<br># **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2012/B-COM)**<br># **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2012/B-ENVS)**<br># **Bachelor of Music (https://handbook.unimelb.edu.au/view/2012/B-MUS)**<br>You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects. |
| **Fees Information:** | Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees |
| **Generic Skills:** | The subject will enhance the following generic skills:<br># Ability to apply fundamental science and engineering knowledge<br># Capacity for independent thought<br># Ability to analyse and solve open-ended problems<br># Ability to comprehend complex concepts and communicate lucidly this understanding<br># Awareness of advanced technologies in the discipline<br># Ability to work in a team (practical work component) |
| **Related Course(s):** | Bachelor of Engineering |
| **Related Majors/Minors/ Specialisations:** | B-ENG Chemical Engineering stream<br>B-ENG Chemical and Biomolecular Engineering stream<br>Master of Engineering (Chemical)<br>Science-credited subjects - new generation B-SCI and B-ENG. Core selective subjects for B-BMED. |