

521-301 Protein Structure, Design & Engineering

Credit Points:	12.500
Level:	Undergraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Semester 1, - Taught on campus.
Time Commitment:	Contact Hours: 36 lectures (three per week) Total Time Commitment: 120 hours
Prerequisites:	Biochemistry 521-211, 521-212 and 521-220. BBiomedSc students: 521-213 and 536-250.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact upon their active and safe participation in a subject are encouraged to discuss this with the relevant subject coordinator and the Disability Liaison Unit.
Coordinator:	A/Prof G Howlett
Subject Overview:	<p>By the end of the subject, the student should have developed an appreciation of the impact of structural biology on biomedical research and biotechnology, and also an understanding of the structural properties of proteins. The subject matter addresses how proteins fold in vivo and in vitro; how protein design and engineering is used for investigating structure-function relationships; and the challenges of producing recombinant proteins for pharmaceutical and industrial applications. The theoretical background to the major techniques used in modern protein chemistry and their applications in biotechnology will also be covered. The following topics will be presented: general properties of protein structure; the major classes and topologies of proteins; evolution of sequence, structure and function; protein folding and molecular chaperones; protein design for biotechnology; designing proteins de novo; computer-based prediction of protein fold; binding of small molecules to proteins and drug design; protein-protein interactions; transcription factors and their interactions with DNA; effects of point mutations on tertiary structure, protein stability and biological functions; and enzyme reaction kinetics. Examples from the classical and current scientific literature will include immunoglobulins and the use of molecular scaffolds, phage display and DNA shuffling techniques, amyloid fibrils and disease, transcription factors and protein mediators of signal transduction.</p> <p>In addition to these specific skills, students will think critically from consideration of the lecture material and research papers, expand from theoretical principles to practical explanations through observing and reporting research literature and acquire abilities in collaborative working, while participating in group presentations.</p>
Assessment:	Two 30-minute written tests held during semester (10% total); a 15-minute oral presentation or a written assignment of up to 1500 words during the semester (10%); a 3-hour written examination in the examination period (80%).
Prescribed Texts:	Introduction to Protein Structure (C Branden and J Tooze), 2nd edn, Garland, 1998
Breadth Options:	<p>This subject is a level 2 or level 3 subject and is not available to new generation degree students as a breadth option in 2008.</p> <p>This subject or an equivalent will be available as breadth in the future.</p> <p>Breadth subjects are currently being developed and these existing subject details can be used as guide to the type of options that might be available.</p> <p>2009 subjects to be offered as breadth will be finalised before re-enrolment for 2009 starts in early October.</p>

Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Notes:	Students enrolled in the BSc (pre-2008 BSc), BASc or a combined BSc course will receive science credit for the completion of this subject.
Related Course(s):	Bachelor of Arts and Bachelor of Science Bachelor of Arts and Sciences Bachelor of Biomedical Science Bachelor of Computer Science (Bioinformatics) Bachelor of Science Graduate Diploma in Biotechnology