CHEN90011 Bioenvironmental Engineering

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: An average of 3 hours of lectures per week + 2 x three hour practical work sessions per semester + 1 x field trip per semester. Total Time Commitment: Estimated 200 hours
Prerequisites:	Students must have passed the following subject: **Subject** / **Study Period Commencement:** / **Credit Points:** CHEN30001 Reactor Engineering / Semester 1 / 12.50 (Prior to 2010 CHEN40003 Reactor Engineering) as well as ONE OF the following subjects prior to enrolling in this subject: **Subject** / **Study Period Commencement:** / **Credit Points:** CHEN90031 Bioprocess Engineering / Semester 1 / 12.50 (Prior to 2014 CHEN30014 Bioprocess Engineering or BTCH90006 Bioprocess Engineering) CHEN90008 Biology for Engineers (prior to 2013)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	CHEN40014 Bioenvironmental Engineering CHEN40010 Biochemical/Environmental Engineering 2
Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the Subject Co-ordinator and the Disability Liaison Unit http://www.services.unimelb.edu.au/disability/
Coordinator:	Dr Greg Martin
Contact:	Email: **gjmartin@unimelb.edu.au (mailto:gjmartin@unimelb.edu.au)**
Subject Overview:	**AIMS** This is a specialised elective subject covering a range of environmental and waste treatment topics of key importance to society and of relevance to most chemical engineering industries. The subject builds on core chemical engineering knowledge and is complementary to the material presented in the Bioprocess Engineering subject and the Biochemical Engineering

	course. In this subject, students will develop a broad understanding of the nature of waste streams and the principles underlying their treatment. The subject will allow students to learn how to apply chemical and bioprocess engineering knowledge in the design and operation of a range of processes used to treat a variety of domestic, industrial and agricultural wastes. In addition to traditional processes, emphasis is placed on how improved processes can be developed to meet future challenges. The principles and technical knowledge developed in this subject are central to chemical engineers working on waste treatment in chemical industries and for municipal water and environmental management. **INDICATIVE CONTENT** Topics covered include: the characteristics of liquid and solid wastes and the objectives of waste treatment; important waste assay procedures; primary, secondary and tertiary wastewater treatment processes; physical and chemical treatment processes for both liquid and solid wastes; biological waste treatment and the role of various microbial groups: anaerobic, facultative, aerobic and aerated lagoons and factors affecting their design; activated sludge and related processes; adherent growth processes and associated design considerations; biological and physico-chemical removal of nitrogen and phosphorus; anaerobic processes and their use in liquid and solid waste treatment; treatment and disposal of biosolids; recycling and reuse of wastes; sustainability and cleaner production. A practical laboratory session using a bench scale wastewater treatment system will also be conducted.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILOs)** On completion of this subject the student is expected to: 1 Understanding the important characteristics of waste streams and the engineering and biological principles underlying their treatment 2 Have gained an understanding of the more important physical, chemical and biological techniques and equipment used in the process design of a variety of waste treatment systems 3 Gained practical experience in the operation of a bench scale activated sludge unit and the common assay procedures used to evaluate its performance
Assessment:	One written two hour test (20%); held mid-semester. Intended Learning Outcomes (ILOs) 1 and 2 are addressed in the mid-semester test Practical work report (10%), of no more than 2000 words, associated with the laboratory experiments with a time commitment of approximately 13-15 hours (in addition to the time spent in the laboratory). Due approximately half way into the semester (On or around week 7). ILO 3 is addressed in the practical work report One written three hour end-of-semester exam (70%). The examination paper will consist of problems designed to test whether the student has acquired understanding of the fundamental engineering and biological principles underlying waste treatment processes. ILOs 1 and 2 are addressed in the examination. Hurdle requirement: A mark of 40% or more in the end of semester examination is required to pass the subject
Prescribed Texts:	None
Recommended Texts:	None
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:	# Capacity for independent thought # 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).
Notes:	**LEARNING AND TEACHING METHODS**

	The subject will be delivered primarily through lectures. In addition, students will also complete a laboratory practical and go on at least one industry field trip which will reinforce the material covered in lectures. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes and lecture slides. The subject LMS site also contains numerical solutions for practice problems. **CAREERS / INDUSTRY LINKS** Visits to one or more municipal wastewater treatment plants will be conducted in the subject. A number of engineers working in the industry will present lectures.
Related Course(s):	Master of Philosophy - Engineering Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream Master of Engineering (Biochemical) Master of Engineering (Chemical)