CHEN90019 Advanced Heat & Mass Transport Processes

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2012, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: An average of 4 hours of lectures per week + 1 x four hour laboratory class per semester Total Time Commitment: Estimated 120 hours
Prerequisites:	Students must have completed the following subject (or equivalent) prior to enrolling in this subject:

Subject	Study Period Commencement:	Credit Points:
CHEN30005 Heat and Mass Transport Processes	Semester 1	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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:	Assoc Prof Ray Dagastine
Contact:	Email: **rrd@unimelb.edu.au (mailto:rrd@unimelb.edu.au)** Email: **stad@unimelb.edu.au (mailto:stad@unimelb.edu.au)**
Subject Overview:	Content: Heat transport processes radiation: basic principles of radiation; shape factors (viewfactors); radiation between grey surfaces in the network approach; applications of networks for various situations. Conduction: Fourier's Law of heat conduction; multi-dimensional heat transfer equations; steady-state heat conduction and the Laplace equation; steady-state conduction with distributed heat source and the Poisson equation; simplified equation for steady-state heat conduction; fins; transient heat conduction and the diffusion equation; examples of simple solution of transient heat conduction; brief introduction to numerical methods for heat conduction problems. Mass transport processes: Multicomponent distillation, including short cut and rigorous techniques for the prediction of column performance. Solvent extraction, including the effect of axial dispersion. Adsorption and ion exchange - types of absorbents, fixed bed adsorber models, isothermal equilibrium and non-equilibrium design and operation. Mass transfer with chemical reaction, homogeneous and heterogeneous reactions, and application to equipment performance and design. Separation processes used in biotechnology. Application of simultaneous heat and mass transfer to separation processes. Applications of liquid extraction, liquid-liquid equilibria; single-stage extraction, choice of solvent/feed ratio; continuous counter-current multistage extraction.
Objectives:	Students successfully completing this subject will be able to: # Apply the principles of heat transfer to conduction and radiation heat transfer problems

	# Analyse and design separation operations including adsorption and ion exchange, multicomponent distillation, simultaneous mass and heat transfer, solvent extractionand mass transfer with chemical reaction
Assessment:	One written 3-hour end-of-semester examination (60%) A written 1-hour mid-semester test (20%) Up to five problem sheets distributed across the semester (20%) An overall mark of 50% and a mark of 40% or more in the end of semester examination are required to pass the subject
Prescribed 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
Related Course(s):	Bachelor of Engineering (Chemical Engineering) Bachelor of Engineering (Chemical and Biomolecular Engineering) Bachelor of Engineering (Chemical) and Bachelor of Arts Bachelor of Engineering (Chemical) and Bachelor of Commerce Bachelor of Engineering (Chemical) and Bachelor of Laws Bachelor of Engineering (Chemical) and Bachelor of Science Bachelor of Engineering (EngineeringManagement) Chemical
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream Master of Engineering (Biomolecular) Master of Engineering (Chemical)