411-201 Introduction to Transport Processes

Credit Points:	12.500
Level:	Undergraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Summer Term, - Taught on campus. Semester 1, - Taught on campus.
Time Commitment:	Contact Hours: Forty-eight hours Total Time Commitment: Not available
Prerequisites:	620-141 Mathematics A and 620-143 Applied Mathematics or equivalent
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Dr D Harvie
Subject Overview:	The objectives of this subject are to understand the fundamental concepts of momentum, heat and mass transfer and to be able to apply this knowledge to the solution of problems in process engineering. Momentum transport: Newton's law of viscosity, viscosity of gases and liquids, shear stress and momentum flux, shell momentum balances in laminar flow; Reynolds number; and boundary layer theory. Heat Transport: Conduction; Fourier's law, thermal conductivities of gases, liquids and solids; steady state conduction through planar and cylindrical resistances; resistances in series; conduction with a heat source; shell thermal energy balances; calculation of temperature profiles in conductors; convection, concept of thermal boundary layer, definition and evaluation of heat transfer coefficients; Nusselt and Prandtl numbers; combined conduction and convection; overall heat transfer coefficients; heat exchangers, cocurrent and counter-current flow, energy balance and rate equations for simple double pipe heat exchangers. Mass Transport: Molecular diffusion, eddy diffusion, bulk flow; definitions of concentrations, average velocities and fluxes; Fick's first law; diffusivities of gases and liquids; application to binary mixtures; equimolal counterdiffusion and diffusion through a stationary component; and two-phase mass transfer; concept of mass transfer boundary layer, Schmidt number, individual film and overall mass transfer coefficients.
Assessment:	A mid-semester test worth 15% held in or about Week 6, 10 assignments/tutorials worth 10% throughout semester, and an end of semester examination worth 75%.
Prescribed Texts:	None
Recommended Texts:	Information Not Available
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:	# ability to apply knowledge of basic science and engineering fundamentals # in-depth technical competence in at least one engineering discipline # ability to undertake problem identification, formulation and solution
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 Bachelor of Engineering(Biochemical Engineering)and Bachelor of Science