CHEN90027 Carbon Capture and Storage

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 3 x 1 hour lectures + 1 x 1 hour tutorial per week + 1 x 6 hours of laboratory work per semester Total Time Commitment: Estimated 200 hours
Prerequisites:	

Subject	Study Period Commencement:	Credit Points:
CHEN30001 Reactor Engineering	Semester 1	12.50

(Prior to 2010 CHEN40003 Reactor Engineering)

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:	Dr Colin Scholes
Contact:	Dr Colin Scholes Email: **cascho@unimelb.edu.au (mailto:cascho@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject will give an overview of the drivers for carbon capture and storage, the technology and the economics. **INDICATIVE CONTENT** Specific topics will include: Climate Change and Emissions Reduction Measures, Fuel types (coal, oil, gas). Coal chemistry. Other emission sources (natural gas sweetening, cement, iron and steel production) Combustion – conventional pulverized coal, supercritical boilers, IGCC and gasifier design, oxyfuel processes. Coal to liquid fuel processes. Carbon capture using solvent absorption. Other technologies including membranes, adsorbents, chemical looping, cryogenics and gas hydrate technology. Carbon dioxide compression and pipeline transport. Geological Storage – Site selection (containment, capacity, injectivity). Reservoir modeling (static and dynamic), storage in coal seams, enhanced coal bed methane recovery, storage in depleted gas reservoirs and saline formations, enhanced oil recovery. Long term closure and remediation. Economics – levelised cost of electricity, carbon accounting, the economics of CCS. Health and Safety, Risk Assessment and management, legal issues.

Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Discuss the impacts of climate change and the range of measures that can be taken to reduce emissions 2 Describe the operation of a coal fired power station and the integration of carbon capture and storage into this operation 3 Estimate the cost of carbon capture and storage and its impact on the levelised cost of electricity 4 Evaluate different carbon storage options and assess the viability of geosequestration.
Assessment:	Laboratory-based assignment (10%). Time commitment of 13-15 hours. Intended Learning Outcomes (ILOs) 1 to 3 are reinforced by this assignment. Due week 6 Computer-based assignment (10%). Time commitment of 13-15 hours. ILOs 1 to 3 are reinforced by this assignment. Due week 8 3 hour examination (80%). ILOs 1 to 4 are addressed by the examination. Held during the end-of-semester exam period.
Prescribed Texts:	None
Recommended Texts:	Rackley, S.A., 2010, Carbon Capture and Storage, Elsevier
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:	# In-depth technical competence in at least one engineering discipline # Ability to use a systems approach to design and operational performance # Understanding of the social, cultural, global and environmental responsibilities of the professional engineer and the need for sustainable development # Understanding of the principles of sustainable design and development.
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures and tutorials. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes and lecture slides. **CAREERS / INDUSTRY LINKS** Speakers from industry are regular contributors to this subject.
Related Course(s):	Doctor of Philosophy - Engineering Master of Philosophy - Engineering
Related Majors/Minors/ Specialisations:	Master of Engineering (Biochemical) Master of Engineering (Chemical)