# ENGR90029 Analysing Energy Systems

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| **Credit Points:** | 12.5 |
| **Level:** | 9 (Graduate/Postgraduate) |
| **Dates & Locations:** | 2016, Parkville<br>This subject commences in the following study period/s:<br>Semester 1, Parkville - Taught on campus. |
| **Time Commitment:** | Contact Hours: 36 hours: 3 hours per week of lectures/tutorials Total Time Commitment: 200 hours |
| **Prerequisites:** | Admission to a Masters level program. |
| **Corequisites:** | None |
| **Recommended Background Knowledge:** | None |
| **Non Allowed Subjects:** | |

| Subject | Study Period Commencement: | Credit Points: |
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| CHEN20007 Chemical Process Analysis 1 | Semester 2 | 12.50 |
| CHEN20008 Chemical Process Analysis 2 | Semester 2 | 12.50 |
| CHEN20010 Material and Energy Balances | Semester 1, Semester 2 | 12.50 |
| CHEN20011 Chemical Process Analysis | Semester 2 | 12.50 |

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| **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: <a href="http://services.unimelb.edu.au/disability">http://services.unimelb.edu.au/disability</a> |
| **Coordinator:** | Prof Paul Webley |
| **Contact:** | Prof Paul Webley<br>**paul.webley@unimelb.edu.au (mailto:paul.webley@unimelb.edu.au)** |
| **Subject Overview:** | **AIMS**<br>This subject forms one of the core units in the Masters of Energy Systems and the overall aims are to introduce the students to the tools and skills needed to analyse energy systems. To accomplish this overall aim, the subject introduces material and energy balances used in energy system calculations, and introduces and applies the Laws of Thermodynamics to simple energy systems.<br>This subject, together with ENGR90028 Introduction to Energy Systems, ENGR90030 Non-Renewable Energy, SCIE90014 Renewable Energy and ENGR90032 Energy Supply and Value Chains provide the core technical content for the Masters of Energy Systems.<br>The ability to analyse existing or new proposed energy systems is essential in assessing the merits and economics of our energy supply. This subject gives the students the opportunity to learn and apply these fundamental tools and skills with relevant and realistic energy systems.<br>**INDICATIVE CONTENT** |

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| | Topics include:<br># Thermodynamic properties<br># Equations of state<br># The conservation of energy in and around energy processing systems<br># Evaluation of enthalpy changes with and without phase change<br># Simplified energy balances for batch, steady-state and adiabatic systems<br># Estimation of heats of combustion<br># Simultaneous material and energy balances<br># Entropy, the Second Law of Thermodynamics and Carnot's principle<br># Simple thermodynamic cycles<br># Exercises in process optimisation and the solution of ill-defined process problems. |
| **Learning Outcomes:** | **INTENDED LEARNING OUTCOMES (ILOs)**<br>On completion of this subject the student is expected to:<br>1 Draw flowsheets for appropriate energy systems<br>2 Calculate energy and mass flows within such systems<br>3 Appreciate the theoretical limits on device performance and determine thermodynamic efficiencies if proposed systems<br>4 Perform process optimisation and solve ill-defined process problems related to energy systems. |
| **Assessment:** | Four assignments (40% total, 10% per assignment); each of no more than 10 pages. Overall time commitment of approximately 45-55 hours (13-15 hours per assignment). Assessed throughout the semester. Intended Learning Outcomes (ILOs) 1 to 4 are addressed in the assignments One written end-of-semester two-hour exam (60%). ILOs 2 and 3 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 |
| **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 scientific fundamentals<br># Ability to communicate effectively with the community at large<br># Ability to undertake problem identification, formulation and solution<br># Ability to use a systems approach to the analysis of operational performance<br># Understanding of the social, cultural, global and environmental responsibilities of a professional, and the need for sustainable development<br># Understanding of the principles of sustainable design and development. |
| **Notes:** | **LEARNING AND TEACHING METHODS**<br>The subject will be delivered through a combination of lectures and tutorials.<br>**INDICATIVE KEY LEARNING RESOURCES**<br>Students have access to lecture notes and lecture slides. The subject LMS site also contains worked solutions for all tutorial assignments.<br>**CAREERS / INDUSTRY LINKS**<br>Examples used in the tutorials are derived directly from industry practice in energy systems. |
| **Related Course(s):** | Doctor of Philosophy - Engineering<br>Master of Energy Systems |

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