

Master of Engineering (integrated programs)

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School of Aerospace, Mechanical and Manufacturing
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Strategic objectives addressed:

Educational materials (project-based learning) and teaching team capacity for the new suite of Master of Engineering programs. Contributing to:

- A transformative student experience.

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Funding scheme	LTIF contestable	
	Program Development Fund	X
	RMIT Vietnam Program Development Fund	

1 Executive summary

The Program Development Funds for “Core course development for a new suite of Master of Engineering programs” supported development of four flagship core courses and related materials for a new suite of MEng programs. The programs are pioneering an innovative project-based learning approach in which students work in multi-disciplinary teams on common projects that are shared across the six MEng programs and four flagship courses. Web-based tools and materials to support inquiry-based learning approaches in these four core courses were developed. The development supports contemporary learning activities and course materials that focus on real engineering-research work problems as a basis for inquiry. The main objective of the learning in these core courses is to ensure students learn and work within real situation frameworks, to work as a team so as to promote learning through self-generating questions, analysis and reflection and to embed a questioning and an inquiry based framework into these MEng programs.

Staff from the program fields of Mechanical Engineering, Robotics & Mechatronics, Transport Systems, Environmental Engineering, Process Engineering and Civil Engineering worked collaboratively to achieve the aims of the project. The resulting shared common coursework highlights the common ground in engineering principles but also provides industry-specific content for all programs in the suite.

2 Outcomes

The project supports the launch of six new programs that will commence in semester 1 2016. Commencing student numbers are not currently finalised but application and offer numbers are encouraging and a commencing group of 50 students is a conservative estimate.

3 Project outcomes and impacts

In 2015 funding for the Integration Co-ordinator activity was provided by the RMIT University central Program Development Fund. In 2016 continuing support is requested from SAMME and SCECE. A description of activities completed is included below.

The new suite of Master of Engineering programs will commence in Semester 1 2016, inclusive of:

- MC258 Master of Engineering (Mechanical Engineering)
- MC256 Master of Engineering (Robotics and Mechatronics Engineering)
- MC261 Master of Engineering (Transport Systems Engineering)
- MC254 Master of Engineering (Environmental Engineering)
- MC255 Master of Engineering (Process Engineering)
- MC257 Master of Engineering (Civil Engineering).

A key feature of the integration of the programs is the development of four common core courses, which underpin these programs and are mandatory for all students. These core common courses are:

- OENG 1115 Innovation and Technology Management
- OENG 1117 Risk and Project Management
- OENG 1116 Modelling and Simulation of Engineering Systems
- OENG 1118 Sustainable Engineering Practice and Design.

An important element for the success of this suite of programs is the ability to continue tailoring program delivery to the needs and expectation of prospective students, and to reflect contemporary and future engineering practice. Strong co-ordination is required to ensure consistency and integration across all facets of the first iteration of program delivery in 2016 - including further development of the inquiry-based learning model (projects), the mandatory common courses and the additional discipline courses for each of the six programs.

3.1 Integration activities in 2015

The following activities have been completed by the Integration Co-ordinator, Program and Course Co-ordinators in 2015 in relation to the development of the common courses:

- Project-based learning activities. This has included the preparation of three engineering projects which are relevant to all six engineering programs and their respective disciplines. The projects are:
 - Option 1. Methane Production. This project is about the generation of methane from waste water treatment, its usages in generating on-site electricity and air pollution assessment
 - Option 2. A Melbourne Road Rail Separation. This project focuses on grade separation construction on road-rail level crossings
 - Option 3. Fired Heater Design. This project involves the design of fired heaters for the oil and gas industry.
- In project-based learning sessions, students will work in collaborative, cross-disciplinary groups (up to 4 students per group). Development has included specification and elaboration of the projects themselves and also identification of appropriate learning and teaching methodologies, assessments and resources. The projects are presented on the Google site: (<https://sites.google.com/a/rmit.edu.au/master-of-engineering-engineering-project/>). Originally six potential projects were scoped, but three were selected for further development.

The Integration Co-ordinator has assisted Program and Course coordinators with the development of the common courses to ensure consistency and program integrity.

- Content, learning and teaching activities and resources for each of the common courses have been developed in order to:
 - a) Broaden students' knowledge, skills and their application in key areas of contemporary engineering practice (innovation, risk, sustainability and modelling)
 - b) Equip students to potentially contribute to the resolution of problems and attainment of deliverables inherent in each of the projects. For example, in OENG116 Modelling and Simulation, five modelling topics have been identified and developed which relate directly to project deliverables. The identified modelling topics include:
 - Methane Air Impact Assessment
 - Fluid Dynamics
 - Structural Analysis
 - Traffic Simulation
 - Heat Transfer.
- The identification and engagement of industry professionals who can value-add to the learning and teaching program.
- For the development of the new courses and associated projects, new teaching platforms have been prepared such as Blackboard shells for the courses and a common Google site for the projects.

Other project management activities undertaken by the Integration Co-ordinator have involved:

- Management of resources
- Timetabling and scheduling of courses
- Facilitation of fortnightly meetings with all the academic stakeholders to track progress of the programs and tasks/actions.

Creation of a repository of all information relating to the development of this new suite of MEng (Integrated) for purposes of Engineers Australia accreditation and RMIT audit procedures.

4 Dissemination strategies and outputs

The primary outputs are the course guides of the shared common courses and the project-based learning sites which support these courses.

5 Evaluation of project outcomes

Associate Professor Tom Steiner SEH DPVC-A has provided oversight of the project to ensure that the outcomes have been achieved.