**INDUSTRY RESEARCH – UNIT SPECIFICATION**

| Programs            | Master of Pavement Technology (MPT) (AQF Level 9)  
<table>
<thead>
<tr>
<th></th>
<th>Graduate Certificate in Pavement Technology (GCPT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit Name</strong></td>
<td>Industry Research</td>
</tr>
<tr>
<td><strong>Unit Code</strong></td>
<td>630</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>One semester</td>
</tr>
<tr>
<td><strong>Credit Points</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Delivery Mode</strong></td>
<td>Online</td>
</tr>
</tbody>
</table>
| **Prerequisites**   | Unit 600: Fundamentals of Roads and Pavements,  
|                    | Unit 613: Road Construction & Drainage Principles,  
|                    | Plus, any 2 elective units                           |
| **Co requisites**   | Nil                                                  |
| **Unit Chair**      | Professor Frank Bullen                               |

**Synopsis**

This unit provides the opportunity for students to undertake industry based research that will augment professional work in pavement engineering and form a foundation for future learning and professional development. It will impart cognitive skills to think critically about research methods, planning, analysis and presentation. The unit encompasses research investigation involving the analysis and interpretation of data, or a critical review and interpretation of literature on an approved topic. The research provides an opportunity for the practical application and integration of the student’s professional background and skills, and studies in supporting units of the Master of Pavement Technology.

**Unit Topics**

**Topic 1** concerns developing a research proposal and outlines the various types of research that may be undertaken by engineers and suggests that most engineers typically undertake research in the applied research space, using a quantitative approach. The importance of developing the research question and topic is stressed along with the need to ensure that the proposed research can be completed within the time allocated to the project.

**Topic 2** succinctly outlines definitions, structures and the role of the literature review in a research report. It stresses how one of the most important roles of the literature review is to show where the proposed research fits within, and augments, the existing international contemporary literature.

**Topic 3** provides an overarching framework to planning a research program, outlining the need to develop a schedule for the entire project and to identify the breadth and depth of testing required to generate adequate and reliable data.
Topic 4 outlines the importance of accurate analysis, interpretation and presentation of experimental results and explores the use of regression and correlation as tools to help explain trends in data. The role of hypothesis testing in engineering is introduced.

Topic 5 involves the provision of guidance on structuring and writing the Research Report and preparing the Visual Presentation.

Unit Learning Outcomes (ULOs)

After completing this unit students will be able to:

1. Develop and justify an integrated research plan and select and apply appropriate research methodologies
2. Source and critically evaluate and synthesise research literature to determine the level of contemporary knowledge in a specialist area.
3. Undertake experimentation, data collection through laboratory and/or field studies and/or critical analysis of the literature.
4. Judge the degree to which research outcomes are supported by the research data and form appropriate conclusions and recommendations based on the research.
5. Apply established theories and techniques to present the significance of their research, findings and make informed recommendations for future research directions.

Assessment Tasks and Weightings

To obtain a pass grade in this Unit 50% overall must be achieved and at least 40% achieved in the final research report.

Unit Assessment consists of four assessment tasks as summarised below. Students must also refer to the Assignments and the Unit Assessment Guide for Industry Research, provided on the CPEELMS. Detailed information is provided for each assessment task. There is no final examination in this Unit.

Assessment Task 1 requires the development of the Research Proposal, the research question and outlining the proposed research methodology to ensure that the proposed research is achievable. The development of the proposal is largely formative and is worth 5% of the total marks for the Unit.

Assessment Task 2 helps to facilitate the structured development of the research by requiring a Research Progress Report, which must include a critical review of the international literature. The progress report will be presented as a concise engineering report. It is worth 20% of the total marks for the Unit.

Assessment Task 3 involves the preparation and submission of the final Research Thesis. The thesis is the capstone of the MPT and should be around 4,000 to 6,000 word equivalents excluding tables, graphs and appendices. It is noted that some theses may vary significantly in length due to the research topic. While the content of a research thesis may vary greatly, the structure remains reasonably consistent as outlined in Industry Research: Unit Material. It is worth 60% of the total marks for the Unit and is independently graded by both the Unit Chair and the workplace research project supervisor.
**Assessment Task 4** provides an opportunity for the *Digital Audio-visual Presentation* of the research outcomes. The presentation must include both visual and audio and may be provided via mediums such as YouTube, a videoed workplace seminar or a similar recording. It is worth 15% of the total marks for the Unit.

**Program Learning Outcomes for the MPT (PLOs)**

The overarching objectives for the MPT is to graduate students who are skilled in the knowledge and application of pavement technology and who have the capacity to become outstanding professionals and leaders in the road engineering field. The MPT learning outcomes listed below contribute to achieving these outcomes.

1. The CPEE MPT graduate will have advanced knowledge across the design, construction and maintenance systems related to pavements and understand the impact of their engineering solutions in global and societal contexts.

2. Graduates will possess a thorough knowledge of the economic and environmental consequences of the implementation of pavement technology and how to implement this knowledge in their professional work by developing technical solutions to best benefit all stakeholders.

3. MPT graduates will be able to synthesise technical knowledge, undertake complex analysis and design in order to identify, formulate and solve problems of professional importance. They will be able to apply existing theories, methods and interpretations, and to work independently and within teams on practical and theoretical problems.

4. The graduate will be able to research and critically evaluate various sources of information using mathematical and computational tools and apply outcomes to structure and formulate professionally sound arguments and judgements. They will identify and utilise state of the art developments within pavement technology as well as apply relevant national and international standards.

5. Graduates will be able to research and apply knowledge, information and skills in new and emerging areas of road and pavement technology and its related fields, in order to carry out advanced assignments and projects and contribute to innovation in pavement technology.

6. Graduates will demonstrate the capacity to effectively communicate through multiple media and share knowledge at all levels including, with specialists, the engineering team and the general public.

**CPEE Graduate Attributes**

The CPEE Graduate Attributes underpin Programs that seek to graduate students who are thinkers, innovators, communicators, leaders and are socially, cultural, ethically and environmentally aware.

1. In-depth knowledge & skills in a discipline area: an in-depth knowledge within the field of study, based on current and emerging national and international practice.

2. Judgement, analysis and problem solving: the ability to define, analyse and create viable solutions to a range of problems and to reflect on potential outcomes.

3. Creativity and inventiveness: the ability to generate creative and innovative solutions to discipline and social challenges.

4. Effective communication and collaboration: the abilities to collaborate, communicate and present information and concepts clearly, fluently and within context to diverse audiences via multiple media.
5. Sustainability, socially and ethically focussed: the ability to respond appropriately to discipline issues with a commitment to sustainability, social and high ethical standards.

6. Information and digital literacy: the ability to recognise when information is needed and to locate, interpret, evaluate, and effectively use the information as required.

7. Lifelong learning to increase self-potential: the ability to pursue personal and work based development in a changing environment through self-managed learning.

Mapping Assessment to ULOs, PLOs and GAs

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Unit Learning Outcome</th>
<th>Program Learning Outcome</th>
<th>Graduate Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Task 1</td>
<td>1</td>
<td>3,4</td>
<td>4,6</td>
</tr>
<tr>
<td>Assessment Task 2</td>
<td>2,3</td>
<td>3,4,5</td>
<td>4,6</td>
</tr>
<tr>
<td>Assessment Task 3</td>
<td>2,3,4,5</td>
<td>1,3,4,5,6</td>
<td>1,2,3,4,6,7</td>
</tr>
<tr>
<td>Assessment Task 4</td>
<td>5</td>
<td>6</td>
<td>4,6,7</td>
</tr>
</tbody>
</table>

Student Workload

Workload distribution will vary significantly across the student cohort. In many cases towards the later part of the semester directed study is closely linked to assessment. The total workload is nominal and student may spend significantly more time due to their intimate involvement with their research.

Total 150 hours
- Assessment 60 to 90 hours
- Directed Study 90 to 60 hours

Required Facilities

Students must have access to the internet, email and word processing and spreadsheet programs.

Prescribed Text(s)


(Note: This text will be provided to students)

Recommended Materials(s)

Numerous links are provided within the Unit to research organisations, international universities, YouTube clips, and research databases.