School of Civil and Environmental Engineering

Term 2, 2020

# CVEN3031 CIVIL AND ENVIRONMENTAL ENGINEERING PRACTICE

## COURSE DETAILS

| | | |
|---|---|---|
| **Units of Credit** | **6** | |
| **Contact hours** | 4 hours per week | |
| **Class** | Mon 09:00 - 11:00 | Weeks 1 – 5 and 7 – 10:<br>Online through Blackboard Collaborate Ultra |
| **Workshop** | Thu 12:00 - 14:00<br>Thu 14:00 - 16:00<br>Thu 16:00 - 18:00 | Weeks 1 – 5 and 7 – 10:<br>Online through Blackboard Collaborate Ultra |
| **Course Coordinator and Lecturer** | Prof Vinayak Dixit<br>Email: v.dixit@unsw.edu.au<br>office: Room 106, Civil Engineering Building | |
| **Course Coordinator** | Dr. Ali Ardeshiri<br>Email: A.Ardeshiri@unsew.edu.au<br>Office: Room 111, Civil Engineering Building | |

## INFORMATION ABOUT THE COURSE

This course is a practice-based curriculum that aims to educate students about real-world applications of civil engineering design. Precisely, this is a project-based course, which introduces the role of transport engineers in planning, designing and managing the transport system. The course will involve working in teams of five to solve a transport engineering project using a microsimulation software (Aimsun). The project involves the identification of major issues and the development of solutions for open-ended problems. This includes considerations of the environmental, economic and social impacts of the proposed solutions. The objective is to further develop the students' research, teamwork, managerial and self-directed learning skills.

## HANDBOOK DESCRIPTION

See link to virtual handbook:

https://www.handbook.unsw.edu.au/undergraduate/courses/2020/cven3031/

## OBJECTIVES

The overarching objectives of the course are to:

- develop students' capabilities to challenge the status quo and lead innovation;
- develop students' capabilities to be independent and collaborative enquirers, and to be able to innovate by applying their knowledge and skills to the solution of novel problems;
- help students become entrepreneurial leaders capable of initiating and embracing innovation, as well as engaging and enabling others.

Other objectives include:

- provide students with experiences typical of what a graduate engineer may encounter;
- allow students to utilise capacity for analytical and critical thinking and problem-solving skills;
- provide students with the freedom to engage in independent and reflective learning;
- enhance students' researching/data gathering skills;
- provide students with opportunities for collaborative group work;
- provide an environment in which students can develop their project management skills;
- give students a respect for ethical practice and social responsibility; and
- enhance students' communication skills.

## TEACHING STRATEGIES

The course requires students to engage with content through a number of formats. A detailed discussion of this is provided in project briefs. A summary is presented below.

**Lectures**: Formal lectures will be delivered to provide key information for projects and examples. Guest lectures supplement the learning by providing recent real-world experiences. Students are expected to attend all the lectures. Further communication will be via Moodle announcements. It is very important that students often check their messages.

**Workshops**: The workshops are designed for team members to meet, plan, work and discuss with demonstrators to present progress and raise any questions or concerns. Students must be present and take part in all workshops. Demonstrators are facilitators of the project i.e. to check progress and give general guidance and encouragement and will not be providing solutions for the assignments.

**Assignment and Private study**: Much of the group project and related assessments will need self-research and study. Private study should include review and reflection of lecture material; field visits; computer analysis; and Internet, library and other research. For each hour of contact, it is expected that students will put in at least 1.5 hours of private study.

## EXPECTED LEARNING OUTCOMES

***This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.***

| | Learning Outcome | EA Stage 1 Competencies |
|---|---|---|
| 1. | *Understanding and knowledge of existing practises of traffic demand estimation* | *PE1.1, PE1.3, PE1.4, PE1.6* |
| 2. | *Learning from the experiences of transport modellers (through guest lectures) and applying them in the context of specified projects* | *PE1.4, PE1.5* |
| 3. | *Applying engineering principles to identify and investigate traffic problems and to devise and evaluate sustainable solutions.* | *PE1.2, PE2.1, PE2.4, PE3.2, PE3.4* |
| 4. | *By the conclusion of this course the student will have gained knowledge and skills in transport microsimulation software.* | *PE2.2, PE2.3, PE3.3* |
| 5. | *Solve problems independently and in a team environment.* | *PE1.3, PE3.3, PE3.6* |

For each hour of contact it is expected that you will put in at least 1.5 hours of private study.

## COURSE PROGRAM

A table of lectures and workshops or practical class topics for each week, indicating the name of lecturer involved (where multiple lecturers teaching in course), online activities, such as discussion forums, and relevant readings from textbook and other reference material identified for the course.

**Term 2 2020**

| Date | Topic | Lecture Content | Demonstration Content |
|---|---|---|---|
| 01/06/2020 (Week 1) | Introduction | Course outline, projects detail, expected outcomes, deadlines, marking criteria, simulation, examples | Understanding the project brief, installation of traffic microsimulation software and familiarising with it |
| 08/06/2020 (Week 2)* | Basics of traffic microsimulation & Software demonstration | Car-following and lane-changing models & Demonstration of software | Literature review, organisation of groups (allocation of tasks), understanding the project brief, developing the base model, incorporating traffic signals and loading demand. |
| 15/06/2020 (Week 3) | OD matrix estimation methods, model calibration and validation | Model calibration and validation, sensitivity analysis, OD matrix estimation methods | Literature review, developing the base model (calibration and validation) |
| 22/06/2020 (Week 4) | Guest Lecture | TBA | Finalising developing the base model and report writing |
| 29/06/2020 (Week 5) | Route choice models | User equilibrium, solution methods, and considerations in the software | Group assignment discussion and scenario analysis |
| 06/07/2020 (Week 6) | | ***Flexibility week for all courses (non-teaching)*** | |
| 13/07/2020 (Week 7) | Mid-Term Examination | Mid-Term Examination | Scenario analysis |
| 20/07/2020 (Week 8) | Cost-benefit analysis | Cost-benefit analysis | Scenario analysis |
| 27/07/2020 (Week 9) | Guest Lecture and consultation for the group project | TBA | Finalise the results and final report preparation |
| 03/08/2020 (Week 10) | Review and trivia | Review of the course, traffic management strategies, and trivia | Seminar presentation |

* Monday 8 June is a public holiday. Students are not expected to attend the lecture, and a recording will be made available a few hours after the lecture.

## ASSESSMENT

**There will be NO final examination.** The final marks for the course will be determined based on the scores from each of the assessment tasks. Overview of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below. Detailed assessment criteria will be provided in the project brief documents.

***Note: The lecturer reserves the right to adjust the final scores by scaling if agreed by the Head of School.***

| No. | Assessment | Weighting | Assessment Criteria |
|---|---|---|---|
| 1 | Moodle Quiz (During Week 4 lecture) | 10% | An online quiz will be administered via Moodle. The Moodle quiz will be based on the material covered in the first 3 weeks of lectures and workshops. This Moodle quiz will assess students' understanding of the basics of traffic microsimulation and the software being used in the course.<br><br>The Moodle quiz will be made accessible at 12:00 pm Monday the 15th of June and will close by 5:00 pm on the 19th of June. The Moodle quiz will be an open-book assessment. Students must submit their responses while the quiz is still active. You will be given only one attempt to do the quiz. Failure to complete/submit a quiz within the accessible time period will result in a mark of zero. It is strongly recommended that students attend Week 4 lecture to receive general feedbacks on the online quiz. |
| 2 | Assignment 1 (Literature Review) | 20% | This assignment will require students to write a literature review on the topic provided to them. The last date of submitting assignment 1 is Friday the 10th of July 2020 at 5:00 pm. The assignment is for individual assessment and must be submitted via the Turnitin link available on the course page in Moodle. The assignment must have a cover sheet according to UNSW template. Late submissions will attract a penalty. |
| 3 | Mid-Term Exam | 25% | The mid-term exam will take place online on week 7 (13/07/2020) during the lecture. The mid-term exam will test the students' ability to synthesise specific parts of the course, demonstrate an understanding of the project, and the software being used in the course. The exam will include calculations. |
| 4 | Group Project | 30% | The group assignment is divided into two sections. For the first section, groups are required to create a base model and submit the assignment by11:59 pm on Sunday the 28/06/2020. Late submissions will attract a penalty. This section contributes to 10% of the total mark. Groups should model the base network appropriately, create the OD matrix, calibrate and validate the model and write a report (12 pages maximum) explaining the steps they have taken.<br><br>Section two of the group assignment contribute to 20% of your total mark and it is due by11:59 pm on Sunday the 02/08/2020. Late submissions will attract penalty Groups are required to follow the instruction for this section and investigate different scenarios. Groups are required to provide their analysis based on the given scenarios and write a report (20 pages maximum) discussing their scenario analysis and modelling outcome. They are also required to provide policy guidelines and implications based on their findings. |
| 5 | Presentation | 10% | Groups are required to develop a 3-4 minutes video and explain their group projects, their scenario analysis outcome, and the policies they have recommended for implication. The videos are required to be presented and submitted during the week 10 workshop. And will be assessed based on the oral fluency, the content of the presentation, considerations in the model |

| No. | Assessment | Weighting | Assessment Criteria |
|---|---|---|---|
| | | | development, policy recommendation and capability to answer questions asked after the presentation. |
| 6 | Self-assessment Moodle survey | 5% | Students will be required to provide answers to an online survey regarding the contribution of each member in the group assignment. This survey will be available from 10:00 am Monday the 03/08/2020 and it is due on the 5:00 pm Friday 7/08/2020. Late submissions will attract a penalty. |

**PENALTIES**

*Late submissions will be penalised at the rate of 20% per day after the due time and date have expired.*

**ASSESSMENT OVERVIEW**

| Item | Length | Weighting | Learning outcomes assessed | Assessment Criteria *(this needs to explicitly describe what students are expected to demonstrate in the task)* | Due date and submission requirements | Deadline for absolute fail | Marks returned |
|---|---|---|---|---|---|---|---|
| **1. Individual Assessment** | | | | | | | |
| 1.Online quiz | 30 Minutes | 10% | PE1.1, PE1.2, PE1.3, PE1.6 | This Moodle quiz will assess students' understanding of the basics of traffic microsimulation and the software being used in the course. | 19/06/2020 | 19/06/2020 | 26/06/2020 |
| 2.Assignment 1 (Literature Review) | 7-8 pages | 20% | PE1.1, PE1.3, PE1.4 | • Structure and clarity of the review (including introduction/background and summary)<br>• Perspective and understanding<br>• | 10/07/2020 (5:00 pm) | 15/07/2020 | 24/07/2020 |
| 3.Self-assessment Moodle survey | 30 Minutes | 5% | PE3.6 | • Qualitative and quantitative assessment of the contribution of each member in the group | 07/08/2020 (5:00 pm) | 12/08/2020 | 21/08/2020 |
| **2. Mid-Term Exam** | | | | | | | |
| Mid-Term Exam | 1.5 hr | 25% | PE1.2, PE1.5, PE1.6 PE2.2 | The mid-term exam will test the students' ability to synthesise specific parts of the course, demonstrate an understanding of the project, and the software being used in the course. The exam will include calculations. | 13/07/2020 (during the lecture) Week 7 | 13/07/2020 | 31/07/2020 |
| **3. Group Assessment** | | | | | | | |
| Report 1 (Base model) | 12 | 10% | PE1.2, PE2.1, PE2.2, PE2.4, PE3.2, PE3.4 | • Modelling the network appropriately<br>• Determine the OD matrix<br>• Calibration and validation<br>• Different considerations<br>• Structure and quality of the report including<br>• introduction and conclusions | 28/06/2020 (11:59 pm) | 03/07/2020 | 17/07/2020 |

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|---|---|---|---|---|---|---|---|
| Report 2<br>(Scenario analysis) | 20 | 20% | PE1.2, PE2.1, PE2.2, PE2.4, PE3.2, PE3.4 | • Modelling the network appropriately<br>• Different considerations<br>• Performance analysis | 02/08/2020<br>(11:59 pm) | 07/08/2020 | 21/08/2020 |
| **4. Seminar presentation** | | | | | | | |
| Presentation | 3-4 Minutes | 10% | PE1.3, PE1.5, PE2.2, PE2.4, PE3.2 | • Oral fluency<br>• Content of the presentation<br>• Considerations in the model development<br>• Policy recommendation<br>• Answering questions asked after the presentation | 06/08/2020<br>(during the workshops)<br>Week 10 | 06/08/2020 | 14/08/2020 |

## RELEVANT RESOURCES

- Most course materials and communications outside of lectures/workshops will be provided through Moodle.
- Lecture recordings will be available through Moodle.
- User manuals of Aimsun (traffic microsimulation software).
- Winkle, A and Hart, B "Report writing Style Guide for engineering students" 3rd ed. Faculty of Engineering, Flexible Learning Centre, University of South Australia, 1996.

## DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

https://student.unsw.edu.au/dates

## PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

## ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

**Appendix A: Engineers Australia (EA) Competencies**

*Stage 1 Competencies for Professional Engineers*

| | **Program Intended Learning Outcomes** |
|---|---|
| **PE1: Knowledge and Skill Base** | PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals |
| | PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing |
| | PE1.3 In-depth understanding of specialist bodies of knowledge |
| | PE1.4 Discernment of knowledge development and research directions |
| | PE1.5 Knowledge of engineering design practice |
| | PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice |
| **PE2: Engineering Application Ability** | PE2.1 Application of established engineering methods to complex problem solving |
| | PE2.2 Fluent application of engineering techniques, tools and resources |
| | PE2.3 Application of systematic engineering synthesis and design processes |
| | PE2.4 Application of systematic approaches to the conduct and management of engineering projects |
| **PE3: Professional and Personal Attributes** | PE3.1 Ethical conduct and professional accountability |
| | PE3.2 Effective oral and written communication (professional and lay domains) |
| | PE3.3 Creative, innovative and pro-active demeanour |
| | PE3.4 Professional use and management of information |
| | PE3.5 Orderly management of self, and professional conduct |
| | PE3.6 Effective team membership and team leadership |