School of Civil and Environmental Engineering

UNSW Engineering

CVEN9422

Traffic Management and Control

Term 1, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Meead Saberi	meead.saberi@unsw.edu.au	By appointment only	CVEN 104	

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

Traffic engineering professionals are tasked with the responsibility of ensuring the safe and efficient movement of people and goods through the provision and maintenance of transportation systems. The effectiveness of the transport system defines the economic development and quality of life for the entire community. This course offers students an advanced understanding of the field of traffic management and control, with a focus on traffic flow theory and characteristics of both motorised and non-motorised traffic. The course covers topics including fundamentals of traffic flow theory and analysis, queuing theory, shockwave theory and analysis, microscopic simulation, design and operations of unsignalised and signalised intersections, and network traffic flow.

Course Aims

This course is designed to develop students' understanding, skills and knowledge in the field of traffic and transport engineering. While the focus of the course is clearly on the design, analysis and management of road transport facilities on both the supply and demand side.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Describe relationship between fundamental traffic flow parameters	PE1.1, PE1.2, PE1.3, PE1.4
2. Describe current technologies being used in traffic management and control	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6
3. Apply basic concepts, methods and techniques in urban traffic management and control techniques	PE2.1, PE2.2, PE2.3, PE2.4
4. Apply traffic microsimulation as a tool to evaluate various traffic management and control strategies	PE2.1, PE2.2, PE2.3, PE2.4
5. Analyse traffic data for better understanding of traffic system performance	PE1.3, PE1.5, PE1.6
6. Criticise and formulate existing and potential traffic systems problems	PE1.6, PE1.5
7. Design and analyse various traffic management and control strategies	PE2.1, PE2.2, PE2.3, PE2.4

Teaching Strategies

Please refer to the information in Moodle

Additional Course Information

Course weekly schedule

Week	Date	Topic	Workshop/ Lab	Assessments
1	17/2 Thu	Modelling a Single Vehicle Motion	Workshop	
2	24/2 Thu	Modelling a Group of Vehicles Motion: Car Following and Lane Changing	Computer lab	
3	3/3 Thu	Traffic Flow Characteristics: Flow, Speed and Density	Workshop	Online quiz 1 due Friday 4/3 5:00 PM
4	10/3 Thu	Traffic Flow Theory	Computer lab	
5	17/3 Thu	Shockwave Analysis and Cumulative Plots	Workshop	Assignment 1 due Friday 18/3 5:00 PM
6	24/3 Thu	**Flexibility Week**		
7	31/3 Thu	Uninterrupted and Interrupted Flow (Freeways and Signalised Intersections)	Computer lab	Online quiz 2 due Friday 1/4 5:00 PM
8	7/4 Thu	Pedestrian Traffic Flow Characteristics and Modelling	Workshop	
9	14/4 Thu	Network Traffic Flow Theory: Network or Macroscopic Fundamental Diagram	Computer lab	Online quiz 3 due Friday 15/4 5:00 PM
10	21/4 Thu	Advanced Topics in Traffic Flow Modelling	Workshop	Assignment 2 due Friday 22/4 5:00 PM

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Analysing real GPS data	10%	18/03/2022 05:00 PM	3, 5
2. Micro-simulation	15%	22/04/2022 05:00 PM	3, 4, 5, 6, 7
3. Online Quizzes	15%	Not Applicable	1, 2, 3, 4, 5, 6, 7
4. Computer lab	10%	Not Applicable	2, 3, 4, 5, 6, 7
5. Final exam	50%	Not Applicable	1, 2, 3, 5, 6

Assessment 1: Analysing real GPS data

Submission notes: A single PDF must be uploaded to Moodle.
Due date: 18/03/2022 05:00 PM

Assignment 1 will be released during week 3 and will be due on 18/3 (week 5). This assignment focuses on students understanding of the theory of traffic flow that has been presented during the first 4 weeks of the semester. The assignment will involve solving a series of problems, extending from the problems discussed during the lectures. The assignment will assess the expected learning outcomes and will be assessed based on technical accuracy, clarity in reporting and presentation.

This is not a Turnitin assignment

Assessment 2: Micro-simulation

Submission notes: A single PDF file containing the report with the .ang AIMSUN file must be uploaded on Moodle.
Due date: 22/04/2022 05:00 PM

Assignment 2 will be released during week 7 and will be due on 22/4 (week 10). This assignment allows students to display their understanding of how to develop a microscopic simulation and propose traffic management schemes for realistic scenarios. The assignment will involve investigating a case study and using the knowledge gained within the lectures to develop solutions for the specific case. The assignment will assess the expected learning outcomes and will be assessed based on technical accuracy, clarity in reporting and presentation.

This is not a Turnitin assignment

Assessment 3: Online Quizzes

Submission notes: Moodle-based quiz

Three online Moodle-based quizzes (each worth 5% of the total mark) will be administered on week 3, 7 and 9. The quizzes focus on students understanding of the course content and learning objectives throughout the term. The exam will be assessed based on technical accuracy. Failure to attempt the online quizzes will result in a mark of zero. Students who miss the assessment as a result of illness or

unforeseen circumstances must apply for special considerations through the School of Civil and Environmental Engineering and contact the course coordinator.

This is not a Turnitin assignment

Assessment 4: Computer lab

Submission notes: Computer lab participation and Moodle-based submission

Four computer lab sessions will be administered in week 2,4,7 and 9 (each worth 2.5%). Students will be tasked to conduct data analysis or run a simulation model relevant to the course learning objectives. The students' work will be assessed based on technical accuracy and participation in the lab activities. Student must upload evidence of their lab work on Moodle at the end of each lab session.

This is not a Turnitin assignment

Assessment 5: Final exam

Submission notes: Moodle-based submission

A 2-hour open-book online Moodle-based final exam will be administered at the end of the semester. The exam will be cumulative and intended to assess the students' knowledge of the material covered throughout the entire course. A mark of at least 40% in the final exam is required before the other assessments are included in the final mark.

Hurdle requirement

Example: A mark of at least 40% in the final examination is required before the class work is included in the final mark.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Resources

Recommended Resources

- Daganzo, Carlos. Fundamentals of Transportation and Traffic Operations, Pergamon-Elsevier, Oxford, U.K. (1997).
- Elefteriadou, Lily. Introduction to Traffic Flow Theory, Springer (2014).
- Roess, Roger P., Elene S. Prassas, William R. McShane. Traffic Engineering. Fourth Edition, Upper Saddle River: Pearson Prentice Hall, 2011 (ISBN 0-13-913573-0).
- Monograph on Traffic Flow Theory (free download via https://www.fhwa.dot.gov/publications/research/operations/tft/index.cfm)
- Highway Capacity Manual (2010) (HCM2010), Transportation Research Board
- Austroads (2008-2015). Guide to Traffic Management Set (13 Part Series)
    - Part 2. Traffic Theory
    - Part 3. Traffic Studies Analysis
    - Part 6. Intersections, Interchanges and Crossings
    - Part 8. Local Area Traffic Management
    - Part 7. Traffic Signals

Laboratory Workshop Information

Both workshops and computer laboratory sessions will be held online. No in person (face to face) attendance is required.

For the computer labs, you need to log in to UNSW MyAccess to work with Matlab, Excel and AIMSUN.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final exams in T1 2022 will be held online between 29th April - 12th May inclusive, and supplementary exams between 23rd - 27th May inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- 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

Image Credit

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CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering 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	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in 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	