School of Civil and Environmental Engineering

UNSW Engineering

CVEN9422

Traffic Management and Control

Term 1, 2023

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.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Describe the 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 concepts, methods and techniques in urban traffic management and control	PE2.1, PE2.2, PE2.3, PE2.4
4. Analyse traffic data for better understanding of traffic system performance	PE1.3, PE1.5, PE1.6
5. Formulate and solve existing and potential traffic systems problems	PE1.5, PE1.6
6. Design and assess various traffic management and control strategies using microsimulation and mathematical models	PE2.1, PE2.2, PE2.3, PE2.4

Teaching Strategies

The teaching strategies that will be used and their rationale. Give some suggested approaches to learning in the course.

Private Study

· Review lecture material and textbook

· Do set problems and assignments

· Join Moodle discussions of problems

· Reflect on class problems and assignments

· Download materials from Moodle

· Keep up with notices and find out marks via Moodle

Lectures

· Find out what you must learn

· See methods that are not in the textbook

· Follow worked examples

· Hear announcements on course changes

Demonstrations

· Be guided by demonstrators

· Practice solving set problems

· Ask questions

Assessments

· Demonstrate your knowledge and skills

· Demonstrate higher understanding and problem solving

Laboratory Work

· Hands-on work, to set studies in context

Additional Course Information

Course weekly schedule

Week	Date	Topic	Workshop/ Lab	Assessments
1	15/2 Wed	Modelling a Single Vehicle Motion	Workshop	
2	22/2 Wed	Modelling a Group of Vehicles Motion: Car Following and Lane Changing	Computer lab	

3	1/3 Wed	Traffic Flow Characteristics: Flow, Speed and Density	Workshop	Online quiz 1 due Friday 3/3 5:00 PM
4	8/3 Wed	Traffic Flow Theory	Computer lab	
5	15/3 Wed	Shockwave Analysis and Cumulative Plots	Workshop	Assignment 1 due Friday 17/3 5:00 PM
6	22/3 Wed	**Flexibility Week**		
7	29/3 Wed	Uninterrupted and Interrupted Flow (Freeways and Signalised Intersections)	Computer lab	Online quiz 2 due Friday 31/3 5:00 PM
8	5/4 Wed	Pedestrian Traffic Flow Characteristics and Modelling	Workshop	
9	12/4 Wed	Network Traffic Flow Theory: Network or Macroscopic Fundamental Diagram	Computer lab	Online quiz 3 due Friday 14/4 5:00 PM
10	19/4 Wed	Advanced Topics in Traffic Flow Modelling	Workshop	Assignment 2 due Friday 21/4 5:00 PM

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Analysing Real GPS Data	10%	17/03/2023 05:00 PM	3, 4
2. Micro-Simulation	15%	21/04/2023 05:00 PM	3, 4, 5, 6
3. Computer Lab	10%	Not Applicable	2, 3, 4, 5, 6
4. Online Quizzes	15%	Not Applicable	1, 2, 3, 4, 5, 6
5. Final Exam	50%	Not Applicable	1, 2, 3, 4, 5

Assessment 1: Analysing Real GPS Data

Submission notes: A single PDF file containing the report with the .ang AIMSUN file must be uploaded on Moodle.
Due date: 17/03/2023 05:00 PM

This assignment focuses on students understanding of the theory of traffic flow that has been presented during the first 4 weeks of the term. 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 must be uploaded to Moodle.
Due date: 21/04/2023 05:00 PM

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: Computer Lab

Submission notes: Moodle-based quiz

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. Students may be asked to upload evidence of their lab work on Moodle at the end of each lab session.

This is not a Turnitin assignment

Assessment 4: Online Quizzes

Submission notes: Computer lab participation and Moodle-based submission

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.

This is not a Turnitin assignment

Assessment 5: Final Exam

Submission notes: In-person exam

The Final Exam will be administered at the end of the term.The exam will be cumulative and intended to assess the students' knowledge of the material covered throughout the entire course.

Hurdle requirement

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

Attendance Requirements

For courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must **attend at least 80% of the workshop/lab** in which you are enrolled for the duration of the session.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 5: 13 March - 17 March	Assessment	Analysing Real GPS Data: A single PDF file containing the report with the .ang AIMSUN file must be uploaded on Moodle.
Week 10: 17 April - 21 April	Assessment	Micro-Simulation: A single PDF must be uploaded to Moodle.

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

Workshops and computer laboratory sessions will be held in person only. No recordings will be provided. Participation in the computer laboratory sessions are mandatory to receive the lab assessment mark.

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 2023 will be held on campus between the 28th of April and the11th of May, and Supplementary Exams between the 22nd of May and the 26th of May. 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
- Book an Academic Advising session: https://unswengacademicadvising.as.me/schedule.php

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

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	