School of Civil and Environmental Engineering

Term 1, 2020

CVEN9422
TRAFFIC MANAGEMENT AND CONTROL

COURSE DETAILS

Units of Credit	6	
Contact hours	4 hours per week	
Class	Wednesday, 9:00 – 11:00	Chemical Sc M11 (K-F10-M11)
Workshop	Wednesday, 11:00 – 13:00 (Weeks: 1,3,5,8,10)	Law Library G17 (K-F8-G17) Old Main Building 151 (K-K15-151)
Computer Lab	Wednesday, 11:00 – 13:00 (Weeks: 2,4,7,9)	Civil Engineering 201 (K-H20-201)
Course Coordinator and Lecturer	Dr. Meead Saberi email: meead.saberi@unsw.edu.au office: CVEN 104	
Demonstrators	Tanapon Lee t.lilasathapornkit@unsw.edu.au Hadi Mansourianfar m.mansourianfar@unsw.edu.au	

INFORMATION ABOUT 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.

HANDBOOK DESCRIPTION

See link to virtual handbook:

https://www.handbook.unsw.edu.au/postgraduate/courses/2020/CVEN9422/

OBJECTIVES

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 advanced analysis, management and

control of road transport facilities on both the supply and demand side, importance is also placed on the reporting and presentation of technical material that can be used by high level decision makers.

TEACHING STRATEGIES

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
Workshops	• 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

EXPECTED LEARNING OUTCOMES

On successful completion of this unit, students should be able to:

- Describe relationship between fundamental traffic flow parameters and current technologies being used in traffic management and control
- Apply advanced traffic flow theory concepts, methods and techniques in urban traffic management and control studies
- Apply traffic simulation and analyse traffic data to evaluate various traffic management and control strategies
- Identify and criticise existing and potential traffic management problems and solutions
- Hypothesise and generate appropriate management and control strategies

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

COURSE PROGRAM

TERM 1, 2020

Week	Date	Topic	Workshop/ Lab	Assessments
1	19/2 Wed	Modelling a Single Vehicle Motion	Workshop	
2	26/2 Wed	Modelling a Group of Vehicles Motion: Car Following and Lane Changing	Computer lab	Online quiz 1 due Friday 28/2/2020 11:00 PM
3	4/3 Wed	Traffic Flow Characteristics: Flow, Speed and Density	Workshop	
4	11/3 Wed	Traffic Flow Theory	Computer lab	Online quiz 2 due Friday 13/3/2020 11:00 PM
5	18/3 Wed	Shockwave Analysis and Cumulative Plots	Workshop	Assignment 1 due Friday 20/3/2020 11:00 PM
6	25/3 Wed	**NO TEACHING**		
7	1/4 Wed	Uninterrupted and Interrupted Flow (Freeways and Signalised Intersections)	Computer lab	
8	8/4 Wed	Pedestrian Traffic Flow Characteristics and Modelling	Workshop	Online quiz 3 due Friday 10/4/2020 11:00 PM
9	15/4 Wed	Network Traffic Flow Theory: Network or Macroscopic Fundamental Diagram	Computer lab	Assignment 2 due Friday 17/4/2020 11:00 PM
10	22/4 Wed	Guest Lecture Dr Mohsen Ramezani (University of Sydney) on Advanced Topics in Traffic Flow Theory	Workshop	

ASSESSMENT

The final grade for this course will be based on the sum of the scores from 2 assignments, mid-session exam and the final examination.

Assessment	Weighting	Assessment Criteria
Assignment 1	10%	In this assignment, which will be released in week 1 during the workshop session, students are tasked with real-world GPS-based data collection. Each student must collect data independently and submit the collected data along with a 4-page report describing the collected data (location, time, purpose) and a summarised analysis of their collected trajectories. Details of the data collection project will be released throughout the term. Submission deadline is Friday 20/3/2020 (week 5). A late penalty of 10% per day will apply for failure to submit the data and report by the stated due date. Any material submitted 7 or more days after the deadline will receive a mark of zero.
Assignment 2	15%	The assignment will be released on week 7 and will be due on Friday 17/4/2020 (week 9). This assignment allows students to display their understanding of how to develop a microscopic simulation in AIMSUN 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. A late penalty of 10% per day will apply for failure to submit the assignment by the stated due date. Any reports submitted 7 or more days after the deadline will receive a mark of zero.
Online Quizzes	15% (5% each)	Three online Moodle-based quizzes will be administered on week 3, 5 and 9. The quizzes focuse 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.
Computer Labs	10% (2.5% each)	In each computer lab (week 2,4,7,9), students will be tasked to conduct data analysis or run a simulation model relevant to course learning objectives. The students' work will be assessed based on technical accuracy.
Final Exam	50%	A 2-hour closed-book 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.

Supplementary Examinations for Term 1 2020 will be held on Monday 25th – Friday 29th May (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

PENALTIES

See details for penalties in the assessment table above

RELEVANT 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

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

(Formerly known as Common School Information)

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations: student.unsw.edu.au/special-consideration
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

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