School of Civil and Environmental Engineering

Term 2, 2020

CVEN4402 Transport Systems Part I: Network Analysis

COURSE DETAILS

Units of Credit	6	
Contact hours	5 hours per week	
Class	Tuesday 12:00 - 15:00	Online via Blackboard Collaborate Ultra
Workshop	Wednesday 09:00 - 11:00	Online via Blackboard Collaborate Ultra
	Wednesday 11:00 - 13:00	Online via Blackboard Collaborate Ultra
Course Coordinator and Lecturer	Dr Meead Saberi email: meead.saberi@unsw.edu.au office: CE104	
Postdoctoral Teaching Associate	Dr Ziyuan Gu email: ziyuan.gu@unsw.edu.au office: CE111	

INFORMATION ABOUT THE COURSE

This subject covers planning aspects related to transport systems, including network based analysis techniques, with an emphasis on strategy and policy evaluation related to such work. Selection and application of transport solutions will be investigated during the subject. Knowledge about different types of transport solutions and when and where to apply them are important for transport professionals. Technological innovations, environmental considerations and socio- economic aspects are discussed in the context of the design of transport facilities. The subject material focuses on network theory in some depth, and a reasonable mathematical competency as well as the ability to perform computational work will be required to follow this subject. Computer literacy will be helpful but is not essential.

HANDBOOK DESCRIPTION

See link to virtual handbook

https://www.handbook.unsw.edu.au/undergraduate/courses/2020/cven4402/

OBJECTIVES

Learning objectives of the course are:

- Understand operations research concepts applicable in the field of transport engineering

- Learn optimization techniques adopted in transport engineering practice
- Learn transport modelling concepts and relevance to design process
- Learn computation methods related to different transport modes
- Learn methods to compute accessibility.
- Learn methods to compute route and network performance measures.
- Learn methods to compute optimum locations for urban infrastructure

TEACHING STRATEGIES

Private Study	• Review lecture material and textbook • Do set problems and assignments • Reflect on class problems and assignments • Download materials from Moodle to supplement notes taken in lecture • 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 (multiple choice questions, quizzes, tests, examinations, assignments, site visit reports, laboratory reports etc.)	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

A successful study of this course will enable students to:

Learning Outcome		**EA Stage 1 Competencies***
1.	Explain differences between the various transport system concepts	PE1.1, PE1.3, PE2.2
2.	Recognize the importance of transport system concept for analysis and design	PE1.1, PE1.2, PE1.3, PE1.5, PE2.1, PE2.2
3.	Learn route analysis techniques	PE1.1, PE1.2, PE1.3, PE1.5, PE2.1, PE2.2, PE2.3
4.	Learn network planning techniques	PE1.1, PE1.2, PE1.3, PE1.5, PE2.1, PE2.2, PE2.3
5.	Learn optimum location selection methods	PE1.5, PE2.1, PE2.2, PE2.3

*Please refer to Appendix A for details of competencies.

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

COURSE PROGRAM

Term 2 2020

Week	Date	Topic
1	Tuesday, 2 June	Course Introduction Introduction to Transport Systems, Planning and Networks
2	Tuesday, 9 June	Routing Algorithms
3	Tuesday, 16 June	Convexity and Optimization
4	Tuesday, 23 June	Introduction to User Equilibrium User Equilibrium Assignment Solution Methods
5	Tuesday, 30 June	Path Based UE Solution Methods
6	No Lecture	
7	Tuesday, 14 July	User Equilibrium with Demand Elasticity
8	Tuesday, 21 July	Stochastic User Equilibrium
9	Tuesday, 28 July	System Optimal Assignment Dynamic Traffic Assignment
10	Tuesday, 4 August	Guest lecture by Dr Sajjad Shafiei (CSIRO Data61) and Dr Mehmet Yildirimoglu (University of Queensland)

Workshops will be held on **Wednesdays, Week 1-5 and Week 7-10**, and cover the material from the lecture that week. Workshop attendance is expected. Week 6 is the school term break.

Week	Date	Topic
1	Wednesday, 3 June	Introduction to Transport Systems, Planning and Networks
2	Wednesday, 10 June	Routing Algorithms
3	Wednesday, 17 June	Convexity and Optimization
4	Wednesday, 24 June	User Equilibrium I
5	Wednesday, 1 July	User Equilibrium II
6	No Workshop	
7	Wednesday, 15 July	User Equilibrium with Demand Elasticity
8	Wednesday, 22 July	Stochastic User Equilibrium
9	Wednesday, 29 July	System Optimal Assignment Dynamic Traffic Assignment
10	Wednesday, 5 August	Course Review

ASSESSMENT

The final grade for this course will be based on the sum of the scores from the weekly Moodle Quizzes, 2 major assignments and the final examination. For the values of the single components see the table below:

Assessment	Weighting	Assessment Criteria
Weekly Moodle Quizzes	10%	Online weekly quizzes (administered via Moodle) will be used to gauge participation and provide feedback on students understanding of the course material to date. The Moodle quizzes will be based on the material covered in lectures and workshops. They will be open book and are intended to help prepare the students for the final exam. Moodle quizzes will be made accessible for a 48-hour period (6:00PM Thursday - 6:00PM Saturday). Failure to complete a quiz within the accessible time period will result in a mark of zero. Moodle quizzes may not be administered in some weeks.
2 Assignments	40% (20 each)	There will be 2 major assignments throughout the term, each worth 20%. The questions will be based on the material covered in lectures and workshop. The assignments are intended to build on the skills developed in workshop and help prepare the students for the final exam. Assignments will be assessed on the technical merit and consistency of the methodology followed, with consideration given to the clarity of presentation. The assignments sets will be posted on Moodle two weeks before they are due. Digital copies are expected to be submitted online via Turnitin by the due date. Late submissions will not be accepted. The students may discuss the problem set questions in general terms, and benefit from the insights of their peers; however, each student must present their own solution. Any duplicate submissions (or parts within) will receive a 0%. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment. The assignment topics and due dates are noted below.
Final Exam	50%	An open-book online final exam will be administered via Moodle at the end of the term. The exam will be cumulative and is intended to assess the student's knowledge of the material covered throughout the entire course. The exam will be assessed on technical accuracy. The performance in the final exam will contribute to 50% of the final grade. In order to pass the course, a student MUST achieve a mark greater than 40% in the final exam to demonstrate a holistic understanding of the course material. If below a 40% is scored on the Final Exam, the final exam mark will replace your course mark. The lecturer reserves the right to adjust the final scores by scaling if agreed to by the Head of School. Students who perform poorly in the assignments are recommended to discuss progress with the lecturer during the term.

Supplementary Examinations for Term 2 2020 will be held on Monday 7th September – Friday 11th September (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.

ASSESSMENT OVERVIEW

Item	Length	Weighting	Learning outcomes assessed	Due date and submission requirements
Quizzes				
Quiz 1	2 days	1%	1,2	Saturday, 6 June on 6.00pm on Moodle (week 1)
Quiz 2	2 days	1%	1,2,3	Saturday, 13 June on 6.00pm on Moodle (week 2)
Quiz 3	2 days	1%	1,2	Saturday, 21 June on 6.00pm on Moodle (week 3)
Quiz 4	2 days	1%	1,2	Saturday, 27 June on 6.00pm on Moodle (week 4)
Quiz 5	2 days	1%	1,2,3	Saturday, 4 July on 6.00pm on Moodle (week 5)
Quiz 6	2 days	1%	2,3,4	Saturday, 18 July on 6.00pm on Moodle (week 7)
Quiz 7	2 days	1%	2,3,4	Saturday, 25 July on 6.00pm on Moodle (week 8)
Quiz 8	2 days	1%	2,3,4,5	Saturday, 1 August on 6.00pm on Moodle (week 9)
Quiz 9	2 days	2%	2,3,4,5	Saturday, 8 August on 6.00pm on Moodle (week 10)
Major Assessments				
Assignment 1 Routing & optimization	2 weeks	20%	1,2,3	Friday, 3 July, 6pm on Moodle (week 5)
Assignment 2 Network equilibrium models	2 weeks	20%	2,3,4,5	Friday, 7 August, 6pm on Moodle (week 10)
Final Exam	2 hours	50%	1,2,3,4,5	TBD (Refer to myUNSW)

RELEVANT RESOURCES

All required reading will be provided in the form of lecture notes. Recommended reading (available in the library):

- Modelling Transport, Fourth Edition/Juan de Dios Ortúzar, Luis G. Willumsen
  Published Online: http://onlinelibrary.wiley.com/book/10.1002/9781119993308

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