CVEN4402 Transport Systems Part I: Network Analysis

Semester 1, 2016

Never Stand Still | Faculty of Engineering | School of Civil and Environmental Engineering

COURSE DETAILS

Units of Credit 6

Weeks 1-12:
Lecture Wednesday, 9.00 – 12.00 ChemicalSc M17 (K-F10-M17)

Weeks 2-13:
For workshop location see: http://www.timetable.unsw.edu.au/current/CVEN4402.html

Course coordinator: Lauren Gardner

Lecturer 1: Dr Lauren Gardner Room CE 112

Lecturer 2: Dr David Rey Room CE 105

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.

The URL of the course online handbook is:
http://www.handbook.unsw.edu.au/undergraduate/courses/2015/CVEN4402.html

OBJECTIVES

Learning objectives of the course are:

- Understand operations research concepts applicable in 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

The following teaching strategies will be used the course.

Private Study

- Review lecture material and textbooks

- Do set problems and assignments
- Use Moodle for discussions
- Download class notes from Moodle if not collected during classes
- Reflect on class problems and assignments

Lectures

- Find out what you must learn
- See methods that are not in the textbooks
- 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 abilities

EXPECTED LEARNING OUTCOMES

By successfully completing this course you will be able to

- Explain differences between the various transport system concepts;
- Recognize the importance of transport system concept for analysis and design;
- Learn route analysis techniques;
- Learn network planning techniques;
- Learn optimum location selection methods;

Learn how to select locations for environmentally sensitive facilities

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

ASSESSMENT

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

Strand	Type of assessment	Value
1	Assignment 1	1/4
2	Assignment 2	1/4
3	Final exam	1/2

Assignments are assessed on the technical merit and consistency of the methodology followed. Attention to the detail and demonstrated initiative in experimentation with concepts learned will be rewarded. Late submissions will be penalized.

The Final Examination is closed-book. Its duration is 2 hours. The formal exam scripts may not be retained by candidate. Students who perform poorly in the assignment and workshops are recommended to discuss progress with the lecturer during the semester. The lecturer reserves the right to adjust the final scores by scaling if agreed to by the Head of School.

HURDLE REQUIREMENTS

The pass mark in this course is 50% overall, however, students must score at least 40% in the final examination in order to qualify for a Pass in this course. Please note that passing of all course components is required to pass the subject.

ASSIGNMENTS

Assignment 1	– Routing & optimization	Due: Friday, 15 April 4pm
Assignment 2	– Network equilibrium models	Due: Friday, 20 May 4pm

Drop-off for all assignments is the wooden assignment box labeled “Gardner”, located at: School of Civil & Environmental Engineering, Building H20, level 1, opposite room 114 (Tea Room). Details of assignments are given in separate briefs.

COURSE PROGRAM - LECTURES

Week	Date	Topic
1	Wednesday, 2 March	Introduction to Transport Systems, Planning and Networks
2	Wednesday, 9 March	Routing Algorithms
3	Wednesday, 16 March	Convexity and Optimization
4	Wednesday, 23 March	Introduction to User Equilibrium
Break	Wednesday, 30 March	Mid semester break
5	Wednesday, 6 April	4th Year Field Trip Week – No Class
6	Wednesday, 13 April	User Equilibrium Assignment Solution Methods
7	Wednesday, 20 April	User Equilibrium with Demand Elasticity
8	Wednesday, 27 April	Stochastic User Equilibrium
9	Wednesday, 4 May	System Optimal Assignment and Pricing
10	Wednesday, 11 May	Transport Network Design
11	Wednesday, 18 May	Applications of Traffic Assignment
12	Wednesday, 25 May	Examples of Regional Sydney Planning Models
13	Wednesday, 1 June	Review of Urban Planning Models (Make up Class for Week 5)

RECOMMENDED READING

All required reading will be provided in the form of lecture notes.

Recommended reading (available in the library):

- Khisty, C.J., "Transportation Engineering - An Introduction", Prentice Hall, 1990.
- Ravindran, A., Phillips, Don T. and Solberg, James J. "Operations Research - Principles and Practice", John Wiley and Sons, 1987.
- Yu, Jason C. "Transportation Engineering - Introduction to Planning, Design and Operations", Elsevier, 1982.
- Bell, M.G.H., and Iida, Y. “Transportation Network Analysis” Wiley, 1997
- Ahuja, R.K., Magnanti, T.L., and Orlin, J.B., “Network Flows: Theory, Algorithms, and Applications”, Prentice Hall, Englewood Cliffs, N.J. 1993.

Required reading:

- Sheffi, Yosef.1992,URBAN TRANSPORTATION NETWORKS: Equilibrium Analysis with Mathematical Programming Methods.

Note: Free online download available at http://web.mit.edu/sheffi/www/urbanTransportation.html

UNSW MOODLE

Copies of class notes are available at the Moodle site for this course:
http://teaching.unsw.edu.au/elearning

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:
https://my.unsw.edu.au/student/resources/KeyDates.html

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,
- School policy on Supplementary exams,
- Special Considerations,
- 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:

http://www.engineering.unsw.edu.au/civil-engineering/resources/academic-advice