SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

THE UNIVERSITY OF NEW SOUTH WALES

Semester 1, 2013

CVEN 4402 Transport Systems Part I : Network Analysis

COURSE DETAILS

Units of Credit	6
Contact hours	4 hours per week
Class/Tutorial	Tuesday, 9am – 1pm Electrical Engineering (Building G17), Room G25 Please refer to the timetable for potential updates. http://www.timetable.unsw.edu.au/2013/CVEN4402.html
Course Coordinator and Lecturer	**Prof. S. T. Waller** Email: s.waller@unsw.edu.au Room 110, Civil and Environmental Engineering Building
Teaching Assistant	Dr David Rey, Email: d.rey@unsw.edu.au
Visiting Lecturer	Christopher Zito, Manager Traffic & Transport Modelling at NSW Transport – Roads and Maritime Services (RMS) Others TBA

INFORMATION ABOUT THE COURSE

This subject covers location planning aspects related to transport systems. It covers techniques, strategies and policies 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 also discussed in the context of the location of transport facilities. The subject material covers location theory and network theory in some depth and a reasonable competency to perform computational work will be required to follow this subject. Computer literacy will be helpful but is not essential.

There is a companion subject named Transport Systems - Part II which covers congestion and delay minimisation aspects in transport planning, presented by the same teacher. These two subjects are prepared as self contained subjects and you may attempt this subject without having attempted the companion subject.

HANDBOOK DESCRIPTION

Definition of basic traffic elements, zero flow travel time, capacity, impedance flow relationship. Transport networks. The determination of shortest path, maximum flow, in networks. The topological description of networks. Location theory applications in relation to transport networks. System parameters, performance. Application of network analysis to existing road, rail and air transport systems.

The URL of the course online handbook is:
http://www.handbook.unsw.edu.au/undergraduate/courses/2013/CVEN4402.html

OBJECTIVES

Learning objectives of the course are:

1. Understand operations research concepts applicable in field of transport engineering
2. Learn optimisation techniques adopted in transport engineering practice
3. Learn transport modelling concepts and relevance to design process
4. Learn computation methods related to different transport modes
5. Learn methods to compute accessibility.
6. Learn methods to compute route and network performance measures.
7. Learn methods to compute optimum locations for urban infrastructure.

TEACHING STRATEGIES

The following teaching/learning strategies will be used the course.

Private Study

- Review lecture material and textbook
- Do set problems and assignments
- Reflect on class problems and assignments

Lectures

- Find out what you must learn
- See methods that are not in the textbook
- Follow worked examples
- Hear announcements on course changes

Tutorials

- Be guided by tutors
- Practice solving set problems
- Ask questions

Assessments (assignments)

- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

By successfully completing this course you will be able to

- Explain differences between the various transport system concepts;
- Recognise 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 you will put in at least 1.5 hours of private study.

ASSESSMENT

Assessment is based on two assignments and a final written examination.

- Assignments are worth 30% each.
- Final written examination is worth 40%.

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 penalised.

The written examination will be in the conventional closed book format covering all topic areas.

The formal exam scripts will not be returned. Students who perform poorly in the quick quizzes and tutorials are recommended to discuss progress with the lecturer during the semester. The lecturer reserves the right to adjust the final scores.

ASSIGNMENTS

Assignment 1	Analysis of network routing & optimization	Due 16 April, 2 pm
Assignment 2	Analysis of a network equilibrium	21 May, 2 pm

Drop-off for all assignments is the wooden assignment box labeled "Waller", located at: School of Civil & Environmental Engineering, Building H20, level 1, opposite room 114 (Tea Room)

COURSE PROGRAM

SEMESTER 1 2013

Week	Date	Topic	Assessments Due
1	5-Mar	Introduction to transport systems and terminology	
2	12-Mar	Properties of network traffic flow	
3	19-Mar	Network representation and basic algorithms	Assignment set
4	26-Mar	Routing algorithm design	
X	2-Apr	*No class – Mid-semester break*	
5	9-Apr	Optimization techniques	
6	16-Apr	Network equilibrium/assignment formulations	Assignment due
7	23-Apr	Solution methods	
8	30-Apr	Applications of network assignment	Assignment set
9	7-May	Demand elasticity	
10	14-May	Discrete choice modeling	
11	21-May	Stochastic equilibrium	Assignment due
12	28-May	Advanced models: dynamics, information	
13	4-June	Review	

RELEVANT RESOURCES

Textbooks

(**recommended as reference**)

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**)

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

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:

http://www.lc.unsw.edu.au/onlib/plag.html

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.civeng.unsw.edu.au/info-about/our-school/policies-procedures-guidelines/academic-advice