CVEN2402 Transport Engineering and Environmental Sustainability

Semester 1, 2016

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

COURSE DETAILS

Units of Credit 6
Contact hours 5 hours per week

Week 1 to week 6:

Lecture	Tuesday,	16.00 - 18.00	Keith Burrows Theatre (K-J14-G5)
Lecture	Wednesday,	13.00 - 14.00	Keith Burrows Theatre (K-J14-G5)

Week 7 to week 12:

Lecture	Tuesday,	16.00 - 18.00	Vallentine Annexe 121 (K-H22-121)
Lecture	Wednesday,	13.00 - 14.00	Vallentine Annexe 121 (K-H22-121)

Weeks 2 to week 13:

Workshops Wednesday, 16:00 - 18:00
For location see http://www.timetable.unsw.edu.au/current/CVEN2402.html

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Course coordinator: Lauren Gardner

Lecturer 1: Dr Lauren Gardner
Room CE 112

Lecturer 2: Dr Emily Moylan
Room CE 103

INFORMATION ABOUT THE COURSE

This is the first introductory course into the discipline of transport engineering as part of the broad field of civil and environmental engineering. An outline of the field of transport engineering and its relationships with other engineering and non-engineering disciplines is provided within the course. The basic concepts and terminology of the discipline is introduced. The course comprises of two strands.

The first strand of the course covers the first 6 weeks of the session. This section of the course is concerned with the analysis, design and evaluation of traffic and network systems, including basics of traffic flow theory and the steps of the regional transport planning process. The lectures and workshops will provide an opportunity to learn engineering properties of traffic streams along with relevant measurement and network analysis techniques.

The second strand of the course will be run from week 7 to week 12, and cover analysis methods required for assessment of environmental impacts of traffic and transport systems. This includes technical skills required for evaluation and management of environmental impacts from transport projects and includes topics such as estimation of vehicle emissions, energy consumption and other impacts of transport systems. The course covers the application of planning concepts in development of ecologically sustainable transport systems including life-cycle and cost-benefit analyses. Additionally, estimation of noise levels and engineering solutions to control noise are covered in the context of transport noise generators such as road traffic.

HANDBOOK DESCRIPTION

Link to virtual handbook:
http://www.handbook.unsw.edu.au/undergraduate/courses/2016/CVEN2402.html

OBJECTIVES

The course is expected to develop skills related to the analysis of traffic and transport systems. Topics include: overview of the transport task, trends in motorization, sustainable transport, motorized and non-motorized transport, traffic flow fundamentals, definitions and concepts related to land use and transport systems; prediction methods of future transport demand; modeling and evaluation of transport systems; transport operations and traffic management as well as assessment of environmental and community impacts.

- Understand components of the field of transport engineering.
- Learn the basic terminology of transport and traffic engineering practice.
- Learn urban transport planning concepts adopted by planning agencies and Roads and Traffic Authorities.
- Learn management methods related to road network systems.
- Recognise the importance of transport within the framework of Ecologically Sustainable Development.
- Explain the nature of transport and traffic noise.
- Describe the sources and impacts of transport emissions.
- Assess the sustainability of the transport system from a broad multi-criteria perspective.

TEACHING STRATEGIES

The following teaching strategies will be used the course.

Private Study

- Review lecture material and textbooks
- Do set problems and assignments
- Download class notes from UNSW Moodle to supplement notes taken in lecture
- 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

Tutorials

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

Assessments

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

EXPECTED LEARNING OUTCOMES

A successful study of the first strand will enable students to

- Explain relationships between fundamental traffic flow parameters;
- Describe basics of transport modeling concepts;
- Calculation methods related to each step of the four step planning process;
- Calculate trip generation;
- Calculations methods related to traffic assignment;
- Route choice calculations;
- Perform computational evaluations of network traffic management methods;
- Evaluate the transport system conditions based on demand forecast;

By successfully completing the second strand of this course students will be able to

- Describe the relationships between land use, transport and the environment.
- Explain policy options required to encourage sustainable transport.
- Predict traffic noise levels from traffic and environmental parameters.
- Assess the seriousness of transport noise exposure and identify control measures to reduce the exposure.
- Estimate emissions and energy consumption under different planning scenarios.
- Quantitatively compare prominent vehicle and fuel technologies.
- Work within the generalized cost framework to optimise transport strategies.
- Perform life-cycle based computational evaluations of projects and policies.

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	25%
2	6 x problem sets	25%
1 & 2	Final exam	50%

The Final Examination is closed-book. Its duration is 2 hours. The formal exam scripts may not be retained by candidates. Students who perform poorly in the assignment and tutorials 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

Problem Set 1	- Life Cycle Assessment	Due: Tuesday, 26 April 4pm
Problem Set 2	- Noise Impacts	Due: Tuesday, 03 May 4pm
Problem Set 3	- Power and Efficiency	Due: Tuesday, 10 May 4pm
Problem Set 4	- Energy and Mechanics	Due: Tuesday, 17 May 4pm
Problem Set 5	- Public Transit	Due: Tuesday, 24 May 4pm
Problem Set 6	- Transport Innovations	Due: Wednesday, 1 June 4pm

Details of assignments are given in separate briefs.

COURSE PROGRAM - LECTURES

Week	Date	Topic
	Stream 1: Taught by Dr Lauren Gardner	
1	Tuesday, 1 March	Introduction to Transport Systems and Planning
1	Wednesday, 2 March	The 4-Step Urban Transport Planning Model
2	Tuesday, 8 March	Traffic Flow Theory
2	Wednesday, 9 March	Traffic Flow Theory
3	Tuesday, 15 March	Trip Generation
3	Wednesday, 16 March	Destination Choice
4	Tuesday, 22 March	Mode Choice
4	Wednesday, 23 March	Mode Choice
Break	Tuesday, 29 March	Mid semester break
Break	Wednesday, 30 March	Mid semester break
5	Tuesday, 5 April	Route Choice
5	Wednesday, 6 April	Route Choice
6	Tuesday, 12 April	System Performance Evaluation
6	Wednesday, 13 April	System Performance Evaluation
	Stream 2: Taught by Dr Emily Moylan	
7	Tuesday, 19 April	The Sustainability Framework I
7	Wednesday, 20 April	The Sustainability Framework II
8	Tuesday, 26 April	Air, Water and Noise I
8	Wednesday, 27 April	Air, Waiter and Noise II
9	Tuesday, 03 May	Traditional Vehicles I
9	Wednesday, 04 May	Traditional Vehicles II
10	Tuesday, 10 May	Alternative Vehicles I
10	Wednesday, 11 May	Alternative Vehicles II
11	Tuesday, 17 May	Travel Demand Management: Classic Solutions I
11	Wednesday, 18 May	Travel Demand Management: Classic Solutions II
12	Tuesday, 24 May	Travel Demand Management: Innovations I
12	Wednesday, 25 May	Travel Demand Management: Innovations II

COURSE PROGRAM - WORKSHOPS

Please note that workshops begin in week 2

Week	Date	Topic
Strand 1 – Traffic Engineering and Planning		
2	Wednesday, 9 March	Estimation of speed flow characteristics
3	Wednesday, 16 March	Land Use and Trip Generation
4	Wednesday, 23 March	Trip Distribution and Mode Choice
Break	Wednesday, 30 March	Mid semester break
5	Wednesday, 6 April	Traffic Assignment
6	Wednesday, 13 April	Planning Applications
7	Wednesday, 20 April	In Class Assessment – Quiz 1
Strand 2 – Transport Sustainability		
8	Wednesday, 27 April	Sydney Harbour Bridge Futures
9	Wednesday, 4 May	Calculating noise impacts
10	Wednesday, 11 May	The Volkswagon Case
11	Wednesday, 18 May	Transport Footprinting
12	Wednesday, 25 May	Public Transit
13	Wednesday, 1 June	Sydney Harbour Bridge Revisited

REQUIRED/RECOMMENDED READING

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

Principles of Highway Engineering and Traffic Analysis, Revised Edition/ Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski

Modelling Transport, Fourth Edition/Juan de Dios Ortúzar, Luis G. Willumsen

Sustainable Transportation Systems Engineering: Evaluation & Implementation/Francis Vanek, Largus Angenent, James Banks , Ricardo Daziano , Mark Turnquist

Moving People: Sustainable Transportation Development/Peter Cox

Planning Sustainable Transport/Barry Hutton

Sustainable Transportation Planning: Tools for Creating Vibrant, Healthy, and Resilient Communities/ Jeffrey Tumlin

Sustainable Transportation: Problems and Solutions/ William R. Black

An Introduction to Sustainable Transportation: Policy, Planning and Implementation/Preston L. Schiller, Eric Bruun, Jeffrey R. Kenworthy

Comments: Modelling Transport, Fourth Edition is Published Online: http://onlinelibrary.wiley.com/book/10.1002/9781119993308

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