School of Civil and Environmental Engineering

UNSW Engineering

CVEN3402

Transport Engineering and Environmental Sustainability

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Divya Nair	divya.nair@unsw.edu.au	Tuesday 2-6pm, Wednesday 2-6pm	Room 103, Level 1, H20	+61 2 9065 4861

Lecturers

Name	Email	Availability	Location	Phone
Elnaz Irannezhad	e.irannezhad@unsw.edu.au	Tuesday 2-6 pm, Wednesday 2-6 PM	Room 105, Level 1, H20	+61432712 822

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of 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 5 weeks of the session. This section of the course is concerned with the analysis, design, and evaluation of traffic and network systems, including the basics of traffic flow theory and the steps of the regional transport planning process. The lectures and workshops will provide an opportunity to learn the engineering properties of traffic streams along with relevant measurement and network analysis techniques.

The second strand of the course cover analysis methods required for sustainable transport engineering. This includes technical skills required for the evaluation and management of environmental impacts from transport projects, including estimation of vehicle emissions, energy consumption, and travel demand management. The course covers the application of planning concepts in the development of economically sustainable transport systems including lifecycle and cost-benefit analyses. Additionally, estimation of noise levels and engineering solutions to control noise is covered in the context of transport noise generators such as road traffic.

Course Aims

The first strand 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; modelling and evaluation of transport systems; transport operations and traffic management.

- 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.

The second strand is expected to develop skills related to quantifying sustainability with regard to transport systems. During the course we will:

- 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

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Explain relationships between fundamental traffic flow parameters	PE1.1, PE1.2, PE1.3, PE1.4
2. Explain basic concepts of four-step transport modelling and demonstrate calculation methods related to each step	PE1.1, PE1.2, PE1.3, PE2.1, PE2.2
3. Perform computational evaluations of network traffic management methods	PE1.1, PE1.2, PE1.5, PE2.1, PE2.2
4. Describe the relationships between Land Use, Transport and the Environment	PE1.1, PE1.2, PE1.6
5. Estimate traffic noise levels, emissions and energy consumption under different planning scenarios	PE1.2, PE1.3, PE1.6, PE2.1, PE2.2
6. Apply the generalised cost framework to evaluate transport strategies	PE1.2, PE2.2, PE2.3
7. Perform life-cycle based computational evaluations of projects and policies	PE1.2, PE2.4, PE3.3, PE3.4

Teaching Strategies

Learning process of this course relies on a mixture of lectures, tutorials and assignment activities to apply the learned knowledge.

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

The teaching/learning activities are summarized in the following table:

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 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

Assessment

Students who miss the assessments as a result of illness or unforeseen circumstances must apply for special considerations through **https://student.unsw.edu.au/special-consideration** and contact the course-coordinator.

Students who perform poorly in the assignment and workshops are recommended to discuss progress with the lecturer during the term. The lecturer reserves the right to adjust the final scores by scaling if agreed to by the Head of School.

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. If below a 40% is scored on the Final Exam, the final exam mark will replace your course mark.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Moodle Quiz	5%	16/06/2022 06:00 AM	1, 2, 3
2. Mid-Term Exam	25%	29/06/2022 05:00 PM	1, 2, 3
3. Weekly Moodle Quizzes	20%	Not Applicable	4, 5, 6, 7
4. Final Exam	50%	Not Applicable	1, 2, 3, 4, 5, 6, 7

Assessment 1: Moodle Quiz

Start date: 16/06/2022 04:00 PM
Submission notes: Moodle-based Quiz
Due date: 16/06/2022 06:00 AM
Deadline for absolute fail: Failure to attend the quiz will result in a mark of zero.

An online quiz will be administered via Moodle during Week 3. The Moodle quiz will be based on the material covered in Week 1 to Week 3 lectures and workshops. It will be an open book assessment and are intended to help prepare the students for the mid-session quiz and final exam. The assessment also provides a means for continuous assessment and feedback for students throughout the course. The questions will be marked based on technical accuracy.

Additional details

See Moodle for details

Assessment 2: Mid-Term Exam

Start date: 29/06/2022 03:00 PM
Submission notes: See Moodle for details
Due date: 29/06/2022 05:00 PM
Deadline for absolute fail: Failure to attend the exam will result in a mark of zero.
Marks returned: 15th July

The mid-session exam will cover Strand 1 material and is intended to assess student's knowledge of the

expected learning outcomes, prepare students for the final exam, and discourage last-minute cramming. The exam will be assessed on technical accuracy.

Additional details

See Moodle for details

Assessment 3: Weekly Moodle Quizzes

Submission notes: Moodle-based Quiz
Deadline for absolute fail: Failure to attend the quiz will result in a mark of zero

Strand 2 assessments will be made available as 4 Moodle quizzes. Each assessment will contribute 5% of the final grade. Any late submission will be considered as a fail and no scores will be given to the student. The questions will be based on the material covered in lectures and are designed to build on the skills developed in workshop. Each week, the students will use the assessments to revise the lecture material and solidify the relevant methodologies. The questions will be marked based on technical accuracy.

Additional details

See Moodle for details

Assessment 4: Final Exam

A 2-hour final exam will be administered at the end of the semester. The exam will be cumulative (covering both Strand 1 and Strand 2 material), and intended to assess the student's knowledge of the material covered throughout the entire course. The exam questions (and weighting) will be evenly split between the two strands of the courses. The exam will be assessed on technical accuracy.

Additional details

See Moodle for details

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 30 May - 3 June	Lecture	Outline of the course; Introduction to Transport Systems and Planning
	Lecture	Introduction to the 4-Step Urban Transport Planning Model
	Workshop	Practice Problems: Transport Planning
Week 2: 6 June - 10 June	Lecture	Introduction to Traffic Flow Theory
	Lecture	Fundamental Relationship Between Traffic Flow Elements
	Workshop	Practice Problems: Estimation of speed flow characteristics
Week 3: 13 June - 17 June	Lecture	Trip Generation Models
	Lecture	Trip Distribution Models
	Workshop	Practice Problems: Trip Generation and Distribution
	Assessment	Moodle Quiz: Moodle-based Quiz
Week 4: 20 June - 24 June	Lecture	Mode Choice Models
	Lecture	Traffic Assignment Models
	Workshop	Practice Problems: Mode Choice and Traffic Assignment
Week 5: 27 June - 1 July	Lecture	The 4-step Urban Transport Planning Model Review
	Workshop	Practice Problems: Review of Strand 1
	Assessment	Mid-Term Exam: See Moodle for details
Week 6: 4 July - 8 July		
Week 7: 11 July - 15 July	Lecture	The Sustainability Framework I

	Lecture	The Sustainability Framework II
	Workshop	Quantifying sustainability
	Assessment	Moodle Quiz 1
Week 8: 18 July - 22 July	Lecture	Air, Water and Noise
	Lecture	Climate Change Mitigation and Adaptation
	Workshop	Calculating noise impact
	Assessment	Moodle Quiz 2
Week 9: 25 July - 29 July	Lecture	Traditional and Alternative Vehicles
	Lecture	Public Transit
	Workshop	Fuel economy calculations
	Assessment	Moodle Quiz 3
Week 10: 1 August - 5 August	Lecture	Travel Demand Management I
	Lecture	Travel Demand Management II
	Workshop	Calculating the carbon footprint
	Assessment	Moodle Quiz 4

Resources

Prescribed Resources

All required/recommended reading will be provided on Moodle or available in the library

- Copies of class notes are available at the Moodle site for this course: http://teaching.unsw.edu.au/elearning
- 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
- Modelling Transport, Fourth Edition/Juan de Dios Ortúzar, Luis G. Willumsen
    - Comments: Modelling Transport, Fourth Edition is Published Online: http://onlinelibrary.wiley.com/book/10.1002/9781119993308

See Moodle for details

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final exams in T2 2022 will be held online between 12th - 25th August 2022 inclusive, and supplementary exams between 5th - 9th September 2022 inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://app.acuityscheduling.com/schedule.php?owner=19024765

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Mike Gal.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering 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	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in 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	