



## UNSW Course Outline

# CVEN4402 Transport Systems - Part 1: Network Analysis - 2024

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## General Course Information

**Course Code :** CVEN4402

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**Is a multi-term course? :** No

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Civil and Environmental Engineering

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate, Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This subject covers strategic planning aspects related to transport systems, including transport network-based analysis, modelling and optimisation techniques. Network representation of transport systems and traffic route choice modelling including user equilibrium and system

optimal are the two main broad topics that will be discussed in this subject. Knowledge about different types of transport network solutions and when and where to apply them are important for transport professionals. 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.

## Course Aims

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

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the fundamentals of transport network analysis
CLO2 : Apply route choice analysis techniques
CLO3 : Apply network user equilibrium solution methods
CLO4 : Justify the importance of transport system concept for analysis and design
CLO5 : Apply transport network planning techniques

Course Learning Outcomes	Assessment Item
CLO1 : Describe the fundamentals of transport network analysis	<ul style="list-style-type: none"><li>• Weekly Moodle Quizzes</li><li>• Assignment 1</li><li>• Assignment 2</li><li>• Final Exam</li></ul>
CLO2 : Apply route choice analysis techniques	<ul style="list-style-type: none"><li>• Weekly Moodle Quizzes</li><li>• Assignment 1</li><li>• Assignment 2</li><li>• Final Exam</li></ul>
CLO3 : Apply network user equilibrium solution methods	<ul style="list-style-type: none"><li>• Weekly Moodle Quizzes</li><li>• Assignment 1</li><li>• Assignment 2</li><li>• Final Exam</li></ul>
CLO4 : Justify the importance of transport system concept for analysis and design	<ul style="list-style-type: none"><li>• Weekly Moodle Quizzes</li><li>• Assignment 1</li><li>• Assignment 2</li><li>• Final Exam</li></ul>
CLO5 : Apply transport network planning techniques	<ul style="list-style-type: none"><li>• Weekly Moodle Quizzes</li><li>• Assignment 1</li><li>• Assignment 2</li><li>• Final Exam</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Weekly Moodle Quizzes Assessment Format: Individual	10%	Start Date: Weekly as specified on Moodle Due Date: Weekly as specified on Moodle
Assignment 1 Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: 28/06/2024 05:00 PM
Assignment 2 Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: 02/08/2024 05:00 PM
Final Exam Assessment Format: Individual	50%	Start Date: Not Applicable Due Date: TBA

## Assessment Details

### Weekly Moodle Quizzes

#### Assessment Overview

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.

#### Course Learning Outcomes

- CLO1 : Describe the fundamentals of transport network analysis
- CLO2 : Apply route choice analysis techniques
- CLO3 : Apply network user equilibrium solution methods
- CLO4 : Justify the importance of transport system concept for analysis and design
- CLO5 : Apply transport network planning techniques

#### Assignment submission Turnitin type

Not Applicable

### Assignment 1

#### Assessment Overview

Assignment 1 will focus on Routing & optimization. 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.

### Course Learning Outcomes

- CLO1 : Describe the fundamentals of transport network analysis
- CLO2 : Apply route choice analysis techniques
- CLO3 : Apply network user equilibrium solution methods
- CLO4 : Justify the importance of transport system concept for analysis and design
- CLO5 : Apply transport network planning techniques

## Assignment 2

### Assessment Overview

Assignment 2 will focus on Network Equilibrium Models. 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.

### Course Learning Outcomes

- CLO1 : Describe the fundamentals of transport network analysis
- CLO2 : Apply route choice analysis techniques
- CLO3 : Apply network user equilibrium solution methods
- CLO4 : Justify the importance of transport system concept for analysis and design
- CLO5 : Apply transport network planning techniques

### Assignment submission Turnitin type

Not Applicable

## Final Exam

### Assessment Overview

A closed-book final exam will be administered at the end of the semester. The formal exam scripts may not be retained by candidates. The exam will be closed book, cumulative, and is intended to assess the students' knowledge of the material covered throughout the entire course. The exam will be assessed on technical accuracy.

### Course Learning Outcomes

- CLO1 : Describe the fundamentals of transport network analysis
- CLO2 : Apply route choice analysis techniques
- CLO3 : Apply network user equilibrium solution methods
- CLO4 : Justify the importance of transport system concept for analysis and design
- CLO5 : Apply transport network planning techniques

### Assignment submission Turnitin type

Not Applicable

### Hurdle rules

Example: A mark of at least 40% in the final examination is required before the class work is included in the final mark.

## General Assessment Information

### Grading Basis

Standard

## Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Introduction to Transport Systems, Planning and Networks
	Assessment	Online quiz
Week 2 : 3 June - 9 June	Lecture	Routing Algorithms
	Assessment	Online quiz 2
Week 3 : 10 June - 16 June	Lecture	Convexity and Optimization
	Assessment	Online quiz 3
Week 4 : 17 June - 23 June	Lecture	Introduction to User Equilibrium User Equilibrium Assignment Solution Methods
	Assessment	Online quiz 4
Week 5 : 24 June - 30 June	Lecture	Path Based UE Solution Methods
	Assessment	Online quiz
	Assessment	Assignment 1 due 28/06 at 5 pm
Week 7 : 8 July - 14 July	Lecture	User Equilibrium with Demand Elasticity
	Assessment	Online quiz
Week 8 : 15 July - 21 July	Lecture	Stochastic User Equilibrium
	Assessment	Online quiz
Week 9 : 22 July - 28 July	Lecture	System Optimal Assignment Dynamic Traffic Assignment
	Assessment	Online quiz
Week 10 : 29 July - 4 August	Lecture	Advance topics in transport network modelling
	Assessment	Online quiz
	Assessment	Assignment 2 due 02/08 at 5 pm

## Attendance Requirements

For undergraduate courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must attend at least 80% of the workshop/lab in which you are enrolled for the duration of the sessions.

# Course Resources

## Prescribed Resources

Lectures will be delivered in person and will be recorded through the Echo 360 system.

Workshops will be delivered in person without any recording.

## Recommended Resources

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

Recommended reading (available in the library):

Urban Transportation Networks by Professor Yossi Sheffi (MIT)

<https://sheffi.mit.edu/book/urban-transportation-networks>

Free PDF download link: <http://sheffi.mit.edu/sites/sheffi.mit.edu/files/sheffiurbantransnetworks0.pdf>

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

Published Online: <http://onlinelibrary.wiley.com/book/10.1002/9781119993308>

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Meedad Saberi		CE104		By appointment	No	Yes

## Other Useful Information

### Academic Information

#### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

## II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

## III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

## IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

## Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be

awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## **Faculty-specific 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)

## **School-specific Information**

### **Final Examinations**

Final Exams in T2 2024 will be held on campus between the 9th - 22nd August, and Supplementary Exams between the 2nd - 6th September 2024. You are required to be available

on these dates. Please do not make any personal or travel arrangements during this period.

## School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.