

## CIVL2720: Transportation Engineering and Design

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF  
NEWCASTLE  
AUSTRALIA

## OVERVIEW

<b>Course Description</b>	This course introduces students to methods and underlying principles for the design and control of the elements of road and railway infrastructure. Students also become familiar with transportation system terminology, flow analysis, driver, vehicle and road characteristics, and aspects of road geometrics, road construction, drainage, pavements and maintenance.
<b>Academic Progress Requirements</b>	Nil
<b>Assumed Knowledge</b>	CIVL1100 (previously GENG1001), MATH1110 and MATH1120.
<b>Contact Hours</b>	<b>Callaghan</b> <b>Lecture</b> Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1  <b>Tutorial</b> Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1
<b>Unit Weighting Workload</b>	10 Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

# COURSE OUTLINE

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# CONTACTS

**Course Coordinator**     **Callaghan**  
Prof Shanyong Wang  
Shanyong.Wang@newcastle.edu.au  
(02) 4921 5745  
Consultation: Available via Email (for any non-public matters), and Office (EA219, by email appointment please).

**Teaching Staff**             Other teaching staff will be advised on the course Canvas site.

**School Office**             **School of Engineering**  
EAG02  
EA Building  
Callaghan  
Seng-admin@newcastle.edu.au  
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

# SYLLABUS

**Course Content**

1. Institutional structures.
2. Design criteria for highways and railways.
3. Geometric design for highways and railways, including cross sections, horizontal and vertical alignments, super-elevation, and earthworks.
4. Structural design of railways and pavements.
5. Failures, maintenance, and rehabilitation of transportation infrastructure.
6. Traffic flow and analysis of roads including queuing analysis and level of service assessment.

**Course Learning Outcomes**

**On successful completion of this course, students will be able to:**

1. Apply and present the basic concepts of transportation in civil engineering practice.
2. Utilise the terminology of the highway and railway transportation industries.
3. Present the concepts associated with the geometric and structural design of highway and railway engineering systems.
4. Explain the basic service requirements of highway and detail the procedure to conduct level of service analysis.

**Course Materials**

**Lecture Materials:**

- Lectures slides will be made available on the CANVAS course site.

**Multi-Media Resource:**

- Echo recordings for lectures will be available via the CANVAS course site.

**Other Resources:**

- The following documents might be consulted for further reading:

Garber N.J. and Hoel L.A. "Traffic and Highway Engineering". Fourth Ed. (SI).

Fricker J.D., Whitford R.K. "Fundamentals of transportation engineering - A multimodal systems

approach". Prentice Hall, 2004.

Banks J.H. "Introduction to transportation engineering". McGraw-Hill, 1998.

"Traffic Engineering and Management, Vol 1 and 2". Institute of Transport Studies, Monash University, 2023.

Other resources such as tutorials and past assignments can be found on the CANVAS site.

## ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Road Design and Level of Service	Week 8	Individual	30%	1, 2, 3, 4
2	Pavement Design	Week 11	Individual	20%	1, 2, 3
3	Formal Examination	Exam week	Individual	50%	1, 2, 3, 4

### Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

### Assessment 1 - Road Design and Level of Service

<b>Assessment Type</b>	Written Assignment
<b>Purpose</b>	Evaluate concepts and theory on Road Design and Level of Service.
<b>Description</b>	Design type exercise.
<b>Weighting</b>	30%
<b>Due Date</b>	Week 8
<b>Submission Method</b>	Online

The assignment questions will be posted on CANVAS at least two weeks prior to the submission date.

<b>Assessment Criteria</b>	Marking rubric provided.
<b>Return Method</b>	Online
<b>Feedback Provided</b>	Online - . Feedback will be provided as written comments on submission, general feedback about the general performance of the student cohort, and self-assessment with a worked solution. Students can also come to course coordinator to discuss their marked submission.

### Assessment 2 - Pavement Design

<b>Assessment Type</b>	Written Assignment
<b>Purpose</b>	Assess student's knowledge on pavement design.
<b>Description</b>	Design type exercise.
<b>Weighting</b>	20%
<b>Due Date</b>	Week 11
<b>Submission Method</b>	Online

The assignment questions will be posted on CANVAS at least two weeks prior to the submission date.

<b>Assessment Criteria</b>	Marking rubric provided
<b>Return Method</b>	Online

**Feedback Provided** Online - . Feedback will be provided as written comments on submission, general feedback about the general performance of the student cohort, and self-assessment with a worked solution. Students can also come to course coordinator to discuss their marked submission.

## Assessment 3 - Formal Examination

**Assessment Type** Formal Examination  
**Purpose** Final exam  
**Description** 3 hours exam including 4 sections of approximately equivalent weighting. The sections are of increasing difficulty but with decreasing number of questions/section.  
**Weighting** 50%  
**Length** 3 hours  
**Due Date** Exam week  
**Submission Method** Formal Exam  
**Assessment Criteria** Full assessment criteria available on CANVAS  
**Return Method** Not Returned  
**Feedback Provided** No Feedback - .

## ADDITIONAL INFORMATION

### Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

\*Skills are those identified for the purposes of assessment task(s).

### Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

### Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

### Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be

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conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

**Academic Misconduct**

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students at the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

**Adverse Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item, and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

**Important Policy Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

## Graduate Profile Statements

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	<b>Professional Attributes</b>				
11	3.1. Ethical conduct and professional accountability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
12	3.2. Effective oral and written communication in professional and lay domains.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
13	3.3. Creative, innovative, and pro-active demeanour.				
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
16	3.6. Effective team membership and team leadership.				
	<b>Engineering Ability</b>				
7	2.1. Application of established engineering methods to complex engineering problem solving.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
8	2.2. Fluent application of engineering techniques, tools and resources.				
9	2.3. Application of systematic engineering synthesis and design processes.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
	<b>Knowledge Base</b>				
1	1.1. Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
2	1.2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.				
5	1.5. Knowledge of contextual factors impacting the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.	<input checked="" type="checkbox"/>			

*This course outline was approved by the Head of School on the 29/01/24. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*

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