ENEC20004 *Advanced Transportation Engineering Design*
Term 1 - 2024

Profile information current as at 12/05/2024 03:47 pm

General Information

Overview

Advanced Transportation Engineering Design will prepare you to analyse and solve complex transportation problems. You will develop strategies for analysing, managing and controlling traffic; identifying safety issues; and recommending solutions. In this unit, you will apply relevant industrial design standards and guides to solve complex traffic and pavement analysis and design problems involving highway capacity analysis, intersection design and pavement design by considering stakeholders and sustainability requirements. You will also use appropriate industry-relevant software for analysis and design. You are required to work, learn, and communicate effectively in a professional manner, independently and in project teams.

Details

Career Level: *Postgraduate*
Unit Level: *Level 9*
Credit Points: *12*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites

There are no requisites for this unit.
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

Offerings For Term 1 - 2024

- Melbourne
- Online
- Rockhampton

Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website

This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 12-credit Postgraduate unit at CQUniversity requires an overall time commitment of an average of 25 hours of study per week, making a total of 300 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Project (applied)**
Weighting: 30%
2. **Project (applied)**
Weighting: 30%
3. **In-class Test(s)**
Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Student evaluation

Feedback
Students expressed their satisfaction on the learning materials used in this unit.

Recommendation
Unit learning materials should continue to be updated to make them clearer and specific.

Feedback from Student evaluation

Feedback
Students also expressed that the unit was well coordinated.

Recommendation
Unit coordination should continue to be focused on helping students in every step of their learning journey.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Analyse traffic system components and traffic flows to identify key traffic flow parameters and their inter-relationships
2. Apply systematic approaches to conduct capacity analysis and level of service of roadways and intersections
3. Evaluate the pavement sublayer materials properties using appropriate Australian Standards and guidelines
4. Design structural road pavements using appropriate Australian Standards and guidelines
5. Formulate, plan, manage and complete projects individually or in teams in an ethical and professional manner considering stakeholder requirements and principles of sustainable development
6. Demonstrate a professional level of communication and leadership.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory
3.4 Professional use and management of information. (LO: 6N)

Intermediate
1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 2I 3N)
1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 4I)
1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 4I)
2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 4I 5I)
3.2 Effective oral and written communication in professional and lay domains. (LO: 6I)
3.6 Effective team membership and team leadership. (LO: 5N 6I)

Advanced
1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1A 2A 3N)
1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 2A 3I)
1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1A 2A 3I)
2.1 Application of established engineering methods to complex engineering problem solving. (LO: 4A)
2.2 Fluent application of engineering techniques, tools and resources. (LO: 4A 5A)
2.3 Application of systematic engineering synthesis and design processes. (LO: 4A 5A)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N – Introductory, I – Intermediate and A - Advanced.
Refer to the Engineering Postgraduate Units Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information
https://moodle.cqu.edu.au/course/view.php?id=11382

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level ◦ Introductory Level • Intermediate Level • Graduate Level ◦ Professional Level ◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Project (applied) - 30%	•	•			•	•

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
2 - Project (applied) - 30%			•	•	•	•
3 - In-class Test(s) - 40%	•	•	•	•		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Knowledge	○	○	○	○		
2 - Communication	○	○		○	○	○
3 - Cognitive, technical and creative skills	○	○	○	○	○	
4 - Research	○	○	○	○	○	
5 - Self-management	○	○	○	○	○	
6 - Ethical and Professional Responsibility						
7 - Leadership					○	○
8 - Aboriginal and Torres Strait Islander Cultures						

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes							
	1	2	3	4	5	6	7	8
1 - Project (applied) - 30%	○	○	○	○	○			
2 - Project (applied) - 30%	○	○	○	○	○			
3 - In-class Test(s) - 40%	○	○	○		○			

Textbooks and Resources

Textbooks

ENEC20004

Supplementary

Traffic Engineering
Edition: 5th edn (2018)
Authors: Roger P. Roess, Elena S. Prassas, Elena S. Prassas
Pearson
Upper Saddle River , NJ , USA
ISBN: 9780134599717
Binding: Hardcover

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Zoom (both microphone and webcam capability)
- Software access (FREEVAL, SIDRA and CIRCLY) (These software can be accessed online on AnyDesk and also available in engineering computer labs at local campuses)

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Kali Nepal Unit Coordinator
k.nepal@cqu.edu.au

Schedule

WEEK 1: TRAFFIC FLOW FUNDAMENTALS AND RELATIONSHIPS - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Traffic flow fundamentals and relationships	A Guide to Traffic Management Part 2: Traffic Theory (AGTM02)	**Tutorial:** Traffic flow fundamentals and relationships **Workshop:** FREEVAL_HCM software

WEEK 2: TRAFFIC FLOW ANALYSIS (1) : CAPACITY AND LEVEL OF SERVICE CONCEPTS - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Capacity and level of service concepts	Highway Capacity Manual (2016) Chapters 4, 5 & 10	**Tutorial:** Capacity and level of service concepts **Workshop:** FREEVAL_HCM software

WEEK 3: TRAFFIC FLOW ANALYSIS (2): FREEWAYS AND MULTILANE ROADS - 18 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Freeways and multilane roads	Highway Capacity Manual (2016) (Chapters 12-14)	**Tutorial:** Freeways and multilane roads **Workshop:** SIDRA software

WEEK 4: TRAFFIC FLOW ANALYSIS (3): TWO-LANE TWO-WAY ROADS - 25 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Two-lane two-way roads	Highway Capacity Manual (Update V6.1 2020) (Chapter 15)	**Tutorial:** Pavement design input parameters **Workshop:** SIDRA software **Project (applied): Advanced Traffic Analysis (**Quiz#1 due)

WEEK 5: ANALYSIS AND DESIGN OF ROAD INTERSECTIONS (1): UNSIGNALISED INTERSECTIONS - 01 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Unsignalised intersections	Highway Capacity Manual (2016) (Chapter 20)	**Tutorial:** Unsignalised intersections **Workshop:** SIDRA software

Vacation Week - 08 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic

WEEK 6: ANALYSIS AND DESIGN OF ROAD INTERSECTIONS (2): ROUNDABOUTS AND TRAFFIC SIGNALS - 15 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Roundabouts and signalised intersections	Highway Capacity Manual (2016) (Chapters 22-23)	**Tutorial:** Roundabouts and signalised intersections **Workshop: Project (applied): Advanced Traffic Analysis (**SIDRA software: DIY) **Project (applied): Advanced Traffic Analysis** (Quiz#2 Due)

WEEK 7: PAVEMENT DESIGN SYSTEM AND PAVEMENT DESIGN INPUT PARAMETERS (1) - 22 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Pavement design input parameters	A Guide to Pavement Technology: Part 2 (AGPT02)	**Tutorial:** Pavement design input parameters **Workshop:** CIRCLY software **Advanced Traffic Analysis** Due: Week 7 Friday (26 Apr 2024) 11:59 pm AEST

WEEK 8: PAVEMENT DESIGN INPUT PARAMETERS (2): PAVEMENT MATERIALS - 29 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Pavement materials	A Guide to Pavement Technology: Part 2 (AGPT02)	**Tutorial:** Traffic calculation spreadsheet **Workshop:** CIRCLY software

WEEK 9: PAVEMENT DESIGN (1): FLEXIBLE PAVEMENTS - 06 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Flexible pavements	A Guide to Pavement Technology: Part 2 (AGPT02)	**Tutorial:** Flexible pavement design **Workshop:** CIRCLY software and flexible pavement design spreadsheet

WEEK 10: PAVEMENT DESIGN (2): RIGID PAVEMENTS - 13 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Rigid pavements	A Guide to Pavement Technology: Part 2 (AGPT02)	**Tutorial:** Rigid pavement design **Workshop:** Rigid pavement design spreadsheet

WEEK 11: PAVEMENT DESIGN (3): PAVEMENT EVALUATION AND TREATMENT DESIGN - 20 May 2024

Module/Topic	Chapter	Events and Submissions/Topic

Pavement evaluation and treatment design	A Guide to Pavement Technology: Part 5 (AGPT05)	Tutorial: Pavement evaluation and treatment design Workshop: **Project (applied)** **Advanced Pavement Design** (DYI) **Advanced Pavement Design** (Quiz due) **Advanced Pavement Design** Due: Week 11 Friday (24 May 2024) 11:59 pm AEST

Week 12: Revision - 27 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
All unit revision including class test	All	

Review/Exam Week - 03 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic

Class test - 10 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
Class test	All	**Class test** Due: Exam Week Monday (10 June 2024) 11:45 pm AEST

Assessment Tasks

1 Advanced Traffic Analysis

Assessment Type
Project (applied)

Task Description
This assessment task relates to the unit learning outcomes 1, 2, 5 and 6. It contains two quizzes (8 Marks) and advanced traffic analysis tasks (22 Marks) and covers Week 1 to Week 6 learning resources. Students are required to complete two quizzes online via Moodle and submit a written 'advanced traffic analysis' report that documents a series of traffic engineering analysis tasks (freeways, multi-lane roads, two-lane two-way roads and traffic intersections). SIDRA software required for this assessment task can be accessed online via AnyDesk and also available in engineering labs at local campuses. FreeVAL is available for free to use upon registration. Details of the tasks will be provided in Moodle.

Assessment Due Date
Week 7 Friday (26 Apr 2024) 11:59 pm AEST

Return Date to Students
Week 9 Friday (10 May 2024)

Weighting
30%

Minimum mark or grade
50%

Assessment Criteria
1. (100%) Content, presentation and layout includes:

- the process and accuracy of calculations
- interpretation of the results
- relevance of information
- application of knowledge
- language and grammar used in answering questions
- proper referencing of sources of information (when referencing, Harvard style should be used.)
- equations, images, data and tables, and the quality of presentation and layout.

2. A similarity check will be always done before marking the submitted documents for all students. Upon detection of any plagiarism including:

- Similarity between submitted document within the same cohort or with the previous cohorts or submitted works to other institutions or using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Analyse traffic system components and traffic flows to identify key traffic flow parameters and their inter-relationships
- Apply systematic approaches to conduct capacity analysis and level of service of roadways and intersections
- Formulate, plan, manage and complete projects individually or in teams in an ethical and professional manner considering stakeholder requirements and principles of sustainable development
- Demonstrate a professional level of communication and leadership.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management

2 Advanced Pavement Design

Assessment Type
Project (applied)

Task Description
This assessment item relates to the unit learning outcomes 3, 4, 5 and 6. It contains a quiz (8 Marks) and advanced pavement design tasks (22 Marks) and covers Week 7 to Week 11 learning resources. Students are required to complete one quiz online via Moodle and submit a written 'advanced pavement design' report that documents a series of alternative pavement designs (flexible pavement alternatives, rigid pavement alternatives and pavement overlays). CIRCLY software required for this assessment task can be accessed online via AnyDesk and also available in engineering labs at local campuses. Details of the task will be provided in Moodle.

Assessment Due Date
Week 11 Friday (24 May 2024) 11:59 pm AEST

Return Date to Students
Week 12 Friday (31 May 2024)

Weighting
30%

Minimum mark or grade
50%

Assessment Criteria
1. (100%) Content, presentation and layout includes:

- the process and accuracy of calculations
- interpretation of the results
- relevance of information
- application of knowledge
- language and grammar used in answering questions

- proper referencing of sources of information (when referencing, Harvard style should be used.)
- equations, images, data and tables, and the quality of presentation and layout.

2. A similarity check will be always done before marking the submitted documents for all students. Upon detection of any plagiarism including:

- Similarity between submitted document within the same cohort or with the previous cohorts or submitted works to other institutions or using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Learning Outcomes Assessed

- Evaluate the pavement sublayer materials properties using appropriate Australian Standards and guidelines
- Design structural road pavements using appropriate Australian Standards and guidelines
- Formulate, plan, manage and complete projects individually or in teams in an ethical and professional manner considering stakeholder requirements and principles of sustainable development
- Demonstrate a professional level of communication and leadership.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management

3 Class test

Assessment Type
In-class Test(s)

Task Description
The time-restricted end-of-the-term class test will be conducted. Class test covers all learning outcomes and all learning resources of the entire trimester. **Exact format , date and time of the test (only one) will be announced/advised/published towards the end of trimester**.

Assessment Due Date
Exam Week Monday (10 June 2024) 11:45 pm AEST
Test timetable will be published/advised towards the end of trimester

Return Date to Students

Weighting
40%

Minimum mark or grade
50%

Assessment Criteria
1. The following assessment criteria will be used for assessing the test:

- The correctness of the answers;
- The correct process followed; and
- Accuracy of the calculations.

2. A similarity check will be always done before marking the submitted test papers for all students. Upon detection of any plagiarism including:

- Similarity between submitted document within the same cohort or with the previous cohorts or

submitted works to other institutions or using the material provided by cheating websites will result in failing that assignment without marking and the student will be reported to the CQU Academic Misconduct team for further actions.

Referencing Style

- Harvard (author-date)

Submission
Offline

Learning Outcomes Assessed

- Analyse traffic system components and traffic flows to identify key traffic flow parameters and their inter-relationships
- Apply systematic approaches to conduct capacity analysis and level of service of roadways and intersections
- Evaluate the pavement sublayer materials properties using appropriate Australian Standards and guidelines
- Design structural road pavements using appropriate Australian Standards and guidelines

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem