



# ENER20001 *Introduction to Railway Engineering*

## Term 2 - 2021

Profile information current as at 26/04/2024 12:54 pm

All details in this unit profile for ENER20001 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

## General Information

### Overview

In this unit, you will engage in a project that offers opportunities for you to explore issues in the design, modelling and analysis of railway vehicle/ track systems. Depending on your previous knowledge and experience, you may choose to investigate traction and braking, vehicle dynamics or structural engineering aspects. You will examine real-world problems and apply state-of-the-art simulation and analysis tools. In the context of a train system (large mining heavy haul, mixed freight or passenger rail) you may solve problems such as control, electrical machines, contact mechanics, multi-body dynamics, stress and strain and vibrations.

### Details

Career Level: *Postgraduate*

Unit Level: *Level 8*

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 2 - 2021

- Melbourne
- Mixed Mode
- Perth
- 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).

### Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

### 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. **Portfolio**

Weighting: 100%

### 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 Students' emails and extension requests.

**Feedback**

The problem with access to Simpack software on the Anydesk platform was reported by the students. The students were unable to connect to Anydesk due to a limited number of available connections.

**Recommendation**

Work with ITD to improve Anydesk performance and investigate alternative software solutions.

#### Feedback from Moodle website

**Feedback**

The disconnect was noticed between some students and a tutor, and this possibly brought down those students' performance outcomes.

**Recommendation**

To encourage students to use the Q&A forum on the website instead of personal emails and to recommend a tutor to provide a quick response to students' inquiries in future offerings.

## Unit Learning Outcomes

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

1. Apply discipline knowledge to a complex rail engineering subsystem
2. Conduct advanced analysis and sensitivity analysis of design parameter(s) in a design/ optimisation process
3. Specify and justify effective design that meets stakeholder requirements
4. Identify and use appropriate techniques to review a design
5. Determine state-of-the-art rail engineering subsystems
6. Reflect on the contribution of this project to your professional development.

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

- 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1N 2N 3N 4N 5N 6N )
- 2.3 Application of systematic engineering synthesis and design processes. (LO: 1N 2N 3N 4N 5N 6N )
- 2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1N 2N 3N 4N 5N 6N )
- 3.1 Ethical conduct and professional accountability. (LO: 1N 4N 6N )
- 3.4 Professional use and management of information. (LO: 1N 2N 4N 5N 6N )
- 3.5 Orderly management of self, and professional conduct. (LO: 1N 2N 4N 5N 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 4N 5N 6N )
- 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2I 3N 4N 5I 6N )
- 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1I 2I 3N 4N 5N 6N )
- 3.2 Effective oral and written communication in professional and lay domains. (LO: 1I 2I 4N 5N 6N )
- 3.3 Creative, innovative and pro-active demeanour. (LO: 1I 2I 4N 6N )

#### 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 2I 3I 4N 5N 6N )
- 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 2I 3N 4N 5I 6N )
- 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1A 2I 3N 4N 5N 6N )
- 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1A 2I 3N 4N 5N 6N )

*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
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### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Portfolio - 100%	•	•	•	•	•	•

### 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 - Portfolio - 100%								

## Textbooks and Resources

### Textbooks

ENER20001

#### Prescribed

##### **Design and Simulation of Rail Vehicles**

1st Edition (2014)

Authors: Spiryagin, M., Cole, C., Sun, Y.Q., McClanachan, M., Spiryagin, V., & McSweeney, T.

CRC Press

Boca Raton , FL , USA

ISBN: 9780429190230

Binding: Other

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#### Supplementary

##### **Handbook of railway vehicle dynamics**

2nd Edition (2019)

Authors: Iwnicki, S., Spiryagin, M., Cole, C. R., & Mcsweeney, T. C. (Eds.)

CRC Press

Boca Raton , FL , USA

ISBN: 9780429469398

Binding: Other

#### Additional Textbook Information

Hardcover and eBook bindings of the textbooks are acceptable for this unit. Both paper and eBook versions of the prescribed text can be purchased at the CQUni Bookshop here: <http://bookshop.cqu.edu.au> (search on the Unit code). The supplementary book is paper format only.

### IT Resources

#### You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Simpack Multibody Software
- MATLAB and Simulink Suite Software
- Gensys Multibody Software

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Maksym Spiryagin** Unit Coordinator

[m.spiryagin@cqu.edu.au](mailto:m.spiryagin@cqu.edu.au)

## Schedule

### Week 1 - 12 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Unpowered Rail Vehicle Design	Chapter 2	

**Week 2 - 19 Jul 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Design of Locomotives	Chapter 3	

**Week 3 - 26 Jul 2021**

Module/Topic	Chapter	Events and Submissions/Topic
General Modelling Techniques	Chapter 4	

**Week 4 - 02 Aug 2021**

Module/Topic	Chapter	Events and Submissions/Topic
General Modelling Techniques	Chapter 4	Submit Brief Report 1

**Week 5 - 09 Aug 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Multibody Dynamics	Chapter 5	

**Vacation Week - 16 Aug 2021**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 6 - 23 Aug 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Multibody Dynamics	Chapter 5	Submit Brief Report 2

**Week 7 - 30 Aug 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Longitudinal Train Dynamics	Chapter 6	

**Week 8 - 06 Sep 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Rail Vehicle-Track Interaction Dynamics	Chapter 7	Submit Brief Report 3

**Week 9 - 13 Sep 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Rail Vehicle-Track Interaction Dynamics	Chapter 7	

**Week 10 - 20 Sep 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Rail Vehicle-Track Interaction Dynamics	Chapter 7	Submit Brief Report 4

**Week 11 - 27 Sep 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Rail Vehicle-Track Interaction Dynamics	Chapter 7	

**Week 12 - 04 Oct 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Rail Vehicle-Track Interaction Dynamics	Chapter 7	

**Review/Exam Week - 11 Oct 2021**

Module/Topic	Chapter	Events and Submissions/Topic
		Submit Brief Report 5

**Exam Week - 18 Oct 2021**

Module/Topic	Chapter	Events and Submissions/Topic
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## Term Specific Information

## Assessment Tasks

### 1 Portfolio

**Assessment Type**

Portfolio

**Task Description**

The Portfolio consists of learning activities, reports (five brief reports) and all models required for a project on the design, behaviour and analysis of a rail vehicle. Formal assessment is by submission of an individual portfolio, which should include five brief reports. All five reports form the Portfolio. Each report should be submitted by the defined submission date for each report. Each report will be marked separately, and each report will contribute 20% of the total Portfolio mark. The marks from the Brief Reports would be totalled and included in the Portfolio final mark for the unit. The late submission of a report will be penalised. Each submitted report must contain all of the student's work defined in the brief report task. All reports should include all compulsory pieces of work including a record of all learning activities, including the description of the development of all models and the simulation outcomes.

**Assessment Due Date****Return Date to Students****Weighting**

100%

**Assessment Criteria**

See the ENER20001 Moodle website.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Submission Instructions**

Submissions should be done through the ENER20001 Moodle website.

**Learning Outcomes Assessed**

- Apply discipline knowledge to a complex rail engineering subsystem
- Conduct advanced analysis and sensitivity analysis of design parameter(s) in a design/ optimisation process
- Specify and justify effective design that meets stakeholder requirements
- Identify and use appropriate techniques to review a design
- Determine state-of-the-art rail engineering subsystems
- Reflect on the contribution of this project to your professional development.

**Graduate Attributes**

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



## 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