



# ENTA13026 *Advanced Engineering Design*

## Term 1 - 2023

Profile information current as at 17/04/2024 11:17 am

All details in this unit profile for ENTA13026 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

Computer-Aided Design (CAD) skills are essential for a variety of engineering professionals. In this unit, you will learn the fundamentals of engineering design and drawings using orthographic projection conventions and sectioning conventions complying with relevant engineering standards with the aid of appropriate software tools. You will develop skills in 3D solid modelling and rendering as well as producing detailed assembly drawings. As part of a team, you will design and construct 3D printed objects gaining an insight into all aspects of the design and rapid prototyping process.

#### Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

#### Pre-requisites or Co-requisites

Prerequisite: Aircraft Structural Maintenance Practices.

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 - 2023

- 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 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 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: 30%

2. **Project (applied)**

Weighting: 30%

3. **Project (applied)**

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](#).

## Unit Learning Outcomes

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

1. Develop and interpret CAD drawings that use orthographic projection and sectioning conventions complying with relevant standards
2. Scale, layout and dimension 2-dimensional and 3-dimensional CAD drawings to provide sufficient information to manufacture artefacts using a range of software tools
3. Produce component detail and assembly CAD drawings including parts lists of artefacts to relevant standards
4. Create a digital twin and a 3D printed prototype of an artefact
5. Create professional documentation of the designs that conform to relevant standards individually and in teams.

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Portfolio - 30%	•	•	•	•	
2 - Project (applied) - 30%	•	•			•
3 - Project (applied) - 40%			•	•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•			•
2 - Problem Solving	•	•		•	
3 - Critical Thinking	•	•	•	•	
4 - Information Literacy	•		•	•	
5 - Team Work				•	•
6 - Information Technology Competence	•	•	•	•	•
7 - Cross Cultural Competence					
8 - Ethical practice					
9 - Social Innovation					
10 - Aboriginal and Torres Strait Islander Cultures					

## Textbooks and Resources

### Textbooks

ENTA13026

#### Prescribed

##### Engineering Drawing

Authors: A. W. Boundy

Binding: Paperback

ENTA13026

#### Supplementary

##### Engineering Drawing Handbook

Authors: SAI Global

Binding: Paperback

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

## Referencing Style

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

For further information, see the Assessment Tasks.

## Teaching Contacts

**Abdul Mazid** Unit Coordinator

[a.mazid@cqu.edu.au](mailto:a.mazid@cqu.edu.au)

## Schedule

### Week 1. Visualisation - 06 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Methods of projection: Orthogonal and Oblique projections	Ch 5 (SAI Global)	

### Week 2. Drawing layout - 13 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Drawing layout and General Practices; Freehand sketching	Ch 1 (Section 1.8) Boundy	

### Week 3. Orthographic projection - 20 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Orthogonal projections: Third angle and First angle Projections	Ch 3 Boundy	

### Week 4. Section Views - 27 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Sectioning and Section Views	Ch 5.9 SAI Global	

**Week 5. Dimensioning - 03 Apr 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Methods of dimensioning: Linear and Angular; Overall dimensioning; Tolerancing	Ch 1.9 Boundy Ch; 11 SAI Global	<b>freehand sketching</b> Due: Week 5 Friday (7 Apr 2023) 12:00 am AEST

**Vacation Week - 10 Apr 2023**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 6. Auxiliary Views - 17 Apr 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Primary and Secondary Auxiliary Views	Ch 4.3 & 4.4 Boundy	

**Week 7. AutoCAD preliminaries - 24 Apr 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Working with lines; Drawing Commands	AutoCAD software & AutoCAD Instructor Ch 15 & 16	

**Week 8. Getting Productive with AutoCAD - 01 May 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Draw section views of objects using AutoCAD	AutoCAD software & AutoCAD Instructor Ch 17 & 18	

**Week 9. Getting productive with AutoCAD - 08 May 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Draw detail drawing of given object/s	Ch 10 SAI Global; AutoCAD software & AutoCAD Instructor	<b>Freehand Sketching and CAD drawing</b> Due: Week 9 Friday (12 May 2023) 12:00 am AEST

**Week 10. Multiview drawing using AutoCAD - 15 May 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Pictorial and Multiview drawing using AutoCAD	AutoCAD software & AutoCAD Instructor; Ch 4 Boundy	

**Week 11. AutoCAD: Sectioning and Dimensioning - 22 May 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Sectioning and Dimensioning using AutoCAD	AutoCAD software & AutoCAD Instructor; Ch 1.9 Boundy	

**Week 12. AutoCAD: Sectioning and Dimensioning (contd.) - 29 May 2023**

Module/Topic	Chapter	Events and Submissions/Topic
Sectioning and Dimensioning using AutoCAD	AutoCAD software & AutoCAD Instructor; Ch 1.9 Boundy	<b>CAD drawing of machine parts</b> Due: Week 12 Friday (2 June 2023) 12:00 am AEST

**Review/Exam Week - 05 Jun 2023**

Module/Topic	Chapter	Events and Submissions/Topic
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**Exam Week - 12 Jun 2023**

Module/Topic	Chapter	Events and Submissions/Topic
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## Assessment Tasks

# 1 freehand sketching

## Assessment Type

Portfolio

## Task Description

This assessment includes freehand sketching of orthographic views (top and necessary side views) of several engineering objects without dimensioning.

Assessment detail document is available in Unit Moodle site.

## Assessment Due Date

Week 5 Friday (7 Apr 2023) 12:00 am AEST

## Return Date to Students

Week 7 Friday (28 Apr 2023)

## Weighting

30%

## Minimum mark or grade

50%

## Assessment Criteria

Assessment 1 marking criteria:

1. Produce neat and accurate sketches complying with AS1100.
2. Demonstrate an clear understanding of several required views of parts applicable for engineering drawings.

NOTE: More particular instruction will be provided in assessment document uploaded in Unit Moodle site.

## Referencing Style

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

## Submission

Online

## Submission Instructions

Submit one pdf document, include title page.

## Learning Outcomes Assessed

- Develop and interpret CAD drawings that use orthographic projection and sectioning conventions complying with relevant standards
- Scale, layout and dimension 2-dimensional and 3-dimensional CAD drawings to provide sufficient information to manufacture artefacts using a range of software tools
- Produce component detail and assembly CAD drawings including parts lists of artefacts to relevant standards
- Create a digital twin and a 3D printed prototype of an artefact

# 2 Freehand Sketching and CAD drawing

## Assessment Type

Project (applied)

## Task Description

This assessment includes freehand sketching, reading and understanding engineering drawings, drawing a part/s taking out of a given assembly drawing. Dimensioning, tolerancing may require. .

Assessment detail document is available in Unit Moodle site.

## Assessment Due Date

Week 9 Friday (12 May 2023) 12:00 am AEST

## Return Date to Students

Week 11 Friday (26 May 2023)

## Weighting

30%

## Minimum mark or grade

50%

## Assessment Criteria

Assessment 2 marking criteria:

1. Neat and accurate manual and CAD drawing complying with AS1100.

2. Demonstrate standard knowledge of reading assembly drawing and understanding dimensions and tolerances of parts in the assembly.
3. Demonstrate preliminary knowledge of applications of CAD tools, dimensioning part drawing and overall dimension of assembly drawings.

NOTE: More particular instruction will be provided in assessment document uploaded in Unit Moodle site.

### Referencing Style

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

### Submission

Online

### Submission Instructions

Submit one pdf document, include a title page.

### Learning Outcomes Assessed

- Develop and interpret CAD drawings that use orthographic projection and sectioning conventions complying with relevant standards
- Scale, layout and dimension 2-dimensional and 3-dimensional CAD drawings to provide sufficient information to manufacture artefacts using a range of software tools
- Create professional documentation of the designs that conform to relevant standards individually and in teams.

## 3 CAD drawing of machine parts

### Assessment Type

Project (applied)

### Task Description

Scope of assessment item 3 is to demonstrate students' capability to read and understand simple assembly drawings, parts dimensions in assembly, required fits, tolerances and surface finish, capability of taking out parts from assembly and produce manufacturing part/detail drawing that will help manufacturing of the parts. Consider 3D printing for sample production.

NOTE: More detail instruction will be provided in assessment document available in Unit Moodle site.

### Assessment Due Date

Week 12 Friday (2 June 2023) 12:00 am AEST

### Return Date to Students

Exam Week Friday (16 June 2023)

### Weighting

40%

### Minimum mark or grade

50%

### Assessment Criteria

Assessment 3 marking criteria:

1. Neat and accurate CAD drawing complying with AS1100.
2. Draw the part drawing with necessary views in a A4 drawing page, unwanted view/s may disadvantage the quality.
3. Show all necessary dimensions (linear, angular) on the part drawing, repeat dimensions may serve as disadvantage.
4. Determine suitable fits and tolerances and assign them, also surface roughness values as required. Unnecessary higher ranges of surface roughness, tolerances and fits increase production cost and these may undermine the quality of your work.
5. Transfer your part drawing to a 3D printing machine as available and produce sample part. Investigate the dimensions you assigned.

NOTE: More specific instructions are available in the assessment item document.

### Referencing Style

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



## Submission

Online

## Submission Instructions

Upload one pdf document, include title page.

## Learning Outcomes Assessed

- Produce component detail and assembly CAD drawings including parts lists of artefacts to relevant standards
- Create a digital twin and a 3D printed prototype of an artefact
- Create professional documentation of the designs that conform to relevant standards individually and in teams.

## 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