



# SAFE20017 Human Factors in Complex Systems

## Term 2 - 2024

Profile information current as at 29/07/2024 04:03 pm

All details in this unit profile for SAFE20017 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

This advanced level unit introduces you to the practices and principles of Human Factors and examines the ways that humans function in complex socio-technical environments and organisational safety systems. This unit discusses the core principles of physical, cognitive, organisational and environmental ergonomics and provides the foundational knowledge required for the discipline of Human Factors. You will learn and apply knowledge in the area of anthropometric variation of the human body to end-user design enhancements as well as discussing concepts of job design in relation to psychological considerations including mental workloads, fatigue management, teamwork and job-fit concepts.

### Details

Career Level: *Postgraduate*

Unit Level: *Level 8*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### 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 - 2024

- Online

### 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 Postgraduate 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. **Group Discussion**

Weighting: 20%

#### 2. **Written Assessment**

Weighting: 40%

#### 3. **Written Assessment**

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 Unit Coordinator Reflection

##### Feedback

Several students failed to grasp the need to analyse "real" tasks for their assessment work.

##### Recommendation

At the commencement of term (Week 1 Tutorial), emphasise the practical nature of assessment items to avoid theoretical submissions.

#### Feedback from Student Unit and Teaching Evaluation data

##### Feedback

The content of this unit was appreciated by students who had no background in human factors and ergonomics

##### Recommendation

Continue to provide the established content.

## Unit Learning Outcomes

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

1. Demonstrate an advanced level knowledge of Human Factors principles and practices across the domains of physical, cognitive, environmental and organisational ergonomics in complex systems
2. Apply knowledge of Human Factors to analyse the appropriateness of fit between end user design in relation to equipment and tasks
3. Evaluate the contribution of cognitive ergonomics in the assessment of equipment design and the introduction of new technology in complex systems
4. Discuss how the concepts of organisational job design relate to psychological considerations including mental workloads, fatigue management, team work and job-fit concepts in systems theory and its relationship to safety
5. Critique contemporary theories of human performance in complex systems.

## 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 - Group Discussion - 20%	•				•
2 - Written Assessment - 40%	•	•			
3 - Written Assessment - 40%			•	•	

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 - Communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3 - Cognitive, technical and creative skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4 - Research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5 - Self-management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6 - Ethical and Professional Responsibility				<input type="radio"/>	<input type="radio"/>
7 - Leadership				<input type="radio"/>	<input type="radio"/>
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 - Group Discussion - 20%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
2 - Written Assessment - 40%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			
3 - Written Assessment - 40%	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

## Textbooks and Resources

### Textbooks

There are no required textbooks.

### 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 styles below:

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Karen Klockner** Unit Coordinator  
[k.klockner@cqu.edu.au](mailto:k.klockner@cqu.edu.au)

## Schedule

### Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Human Factors / Ergonomics Good Work Design	Chapter 1: Introduction to Human Factors (Bridger 2018) <b>Assessment 1 Reading 1</b> - Human Factors and Ergonomics Society Australia (HFESA) Good Work Design Paper <b>Assessment 1 Reading 2</b> - Envisaging Regenerative Futures Through Good Work Design	Zoom Lecture: Introduction to the Unit

### Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Physical Ergonomics 1 <ul style="list-style-type: none"><li>• Anthropometrics</li><li>• Hand tools</li><li>• Workspace Design</li></ul>	Chapter 3: Anthropometry (Bridger 2018) <b>Assessment 1 Reading 3</b> - The Third Age of Human Factors <b>Assessment 1 Reading 4</b> - Working for a Better Tomorrow	Zoom Lecture: Physical Ergonomics - Task Analysis

### Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Physical Ergonomics 2 <ul style="list-style-type: none"><li>• Work physiology</li><li>• Posture</li><li>• Manual handling</li></ul>	Chapter 7: Work capacity, stress, fatigue and recovery (Bridger 2018)	Zoom Lecture: Physical Ergonomics - RULA and REBA

### Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Physical Ergonomics 3 <ul style="list-style-type: none"><li>• Biomechanics</li></ul>	Chapter 2: The body as a mechanical system (Bridger 2018)	Zoom Lecture: Physical Ergonomics - NIOSH Revised Lifting Equation <b>Turning Point Discussions</b> Due: Week 4 Friday (2 Aug 2024) 11:45 pm AEST

### Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Cognitive Ergonomics 1 <ul style="list-style-type: none"><li>• Senses and perception</li><li>• Attention</li><li>• Memory</li><li>• Human Information Processing</li></ul>	Chapter 10: Visual environment (Bridger 2018) Chapter 6: Attention, memory and multitasking (Stone et al. 2017)	Zoom Lecture: Cognitive Ergonomics - Information Processing & Memory

### Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Cognitive Ergonomics 2	Chapter 12: The mind at work (Bridger 2018)	Zoom Lecture: Cognitive Ergonomics - Cognitive Task Analysis
<ul style="list-style-type: none"> <li>• Displays</li> <li>• Mental Workload</li> <li>• Usability</li> </ul>	Chapter 13: Displays and controls (Bridger 2018)	

### Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Cognitive Ergonomics 3	Chapter 7: (Stone et al. 2017)	Zoom Lecture: Cognitive Ergonomics
<ul style="list-style-type: none"> <li>• Decision Making</li> <li>• Skill Acquisition</li> </ul>		<b>Physical Ergonomics Manual Task Analysis</b> Due: Week 7 Thursday (29 Aug 2024) 11:45 pm AEST

### Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Organisational Ergonomics 1	Chapter 11: Human Error (Stone et al. 2017)	Zoom Lecture: Organisational Ergonomics
<ul style="list-style-type: none"> <li>• Human Error and Reliability</li> <li>• Fatigue</li> <li>• Drugs</li> </ul>		

### Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Organisational Ergonomics 2	Chapter 5: Method of Evaluation (Stone et al. 2017)	Zoom Lecture: Organisational Ergonomics
<ul style="list-style-type: none"> <li>• Human-Machine Interaction</li> <li>• Designing for End Users</li> </ul>		

### Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Organisational Ergonomics 3	Chapter 10: Environmental Design (Stone et al. 2017)	Zoom Lecture: Environmental Ergonomics
<ul style="list-style-type: none"> <li>• Environmental Ergonomics</li> </ul>		

### Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Human Factors Tools, Principles and Practice	Chapter 15: HFE in Accident Investigation and Safety Management (Bridger 2018)	Zoom Lecture: Human Factors Futures - Tools, Practice and System Integration

### Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Future Trends in Human Factors	Chapter 12: Future Trends (Stone et al. 2017)	No Lecture in Week 12
		<b>Cognitive Ergonomics Equipment Analysis</b> Due: Week 12 Friday (4 Oct 2024) 11:45 pm AEST

### Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
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### Exam Week - 14 Oct 2024

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

### 1 Turning Point Discussions

#### Assessment Type

Group Discussion

#### Task Description

Students come into a unit with one understanding of the subject and - one hopes - leave with another.

This assessment is therefore interested in your learning journey and the highlights, lightbulb moments or 'turning points' in your early learning about Good Work Design and Human Factors in Complex Systems across the first 2 weeks of term.

Turning points in learning journeys centre on a time when a student experienced a new understanding, a shift in perspective or a deep investment in a particular topic.

In this assessment you will complete two (2) online discussions via the Moodle site.

Your weekly assigned readings from the **Assessment 1 Readings 1 & 2** and **Assessment 1 Readings 3 & 4** will be used for your two online turning point discussions.

You are required to reflect and share your turning point learning experience from your readings via the Moodle site with your class cohort.

You will have until the end of week 4 to complete your readings and post your two discussions.

### **Week 1**

Assessment 1 Reading 1 - Human Factors & Ergonomics Society Australia (HFESA) - Good Work Design

Assessment 1 Reading 2 - Envisaging Regenerative Futures Through Good Work Design

Discussion 1 - Reflect on and describe your turning point learning from your week 1 readings on Good Work Design.

### **Week 2**

Assessment 1 Reading 3 - The Third Age of Human Factors

Assessment 1 Reading 4 - Working for a Better Tomorrow

Discussion 2 - Reflect on and describe your turning point learning from your week 2 reading on the history of human factors and working for a better tomorrow.

There is no need to upload anything in the Moodle assessment area, as this assessment task will be marked using the online discussions that you post.

### **Assessment Due Date**

Week 4 Friday (2 Aug 2024) 11:45 pm AEST

### **Return Date to Students**

Week 5 Monday (5 Aug 2024)

### **Weighting**

20%

### **Assessment Criteria**

Marks will be awarded as follows:-

1. Turning point 1 discussion (10%)
2. Turning point 2 discussion (10%)

Approximately 200 words per discussion.

A detailed marking rubric will be provided via the Moodle site.

### **Referencing Style**

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

### **Submission**

Online

### **Submission Instructions**

There is no need to upload anything into the Moodle site, the discussions will be marked by the Unit Coordinator reviewing your posts in the discussion area.

### **Learning Outcomes Assessed**

- Demonstrate an advanced level knowledge of Human Factors principles and practices across the domains of physical, cognitive, environmental and organisational ergonomics in complex systems
- Critique contemporary theories of human performance in complex systems.

### **Graduate Attributes**

- Knowledge

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

## 2 Physical Ergonomics Manual Task Analysis

### Assessment Type

Written Assessment

### Task Description

An important step in the overall Human Factors and Ergonomics discipline is the ability to identify work tasks which might result in Musculoskeletal Disorders (MSD) risks. This assessment is about developing your understanding of the principles of the assessment of these types of activities using human factors assessment tools.

You are required to choose a two-handed lift manual task activity that might result in a Musculoskeletal Disorder (MSD) being performed in your workplace or another environment, and which is suitable for analysis by the (1) National Institute for Occupational Safety & Health (NIOSH) Revised Lifting Equation and then (2) either the Rapid Upper Limb Assessment (RULA) or the Rapid Entire Body Assessment (REBA) tool. A total of two tools will be used, one of which must be NIOSH and the other tool will be either RULA or REBA.

You are then required to prepare a written report which: -

1. Describes the context of the workplace or other setting and the role of the person involved;
2. Describes the actual task and physical movement being assessed supported by a task analysis;
3. Describes the MSD hazards or issues, and potential effects which pose a problem;
4. Discusses the assessment results and interprets the MSD risk scores using two human factors assessment tools being (1) NIOSH and (2) either REBA or RULA (whichever is most appropriate to the task being assessed i.e. full body or upper body); and
5. Recommends changes to the task, workplace and/ or environment, based on the assessment findings to improve the musculoskeletal functioning of the person performing the task.

Your report should be no more than 2,000 words and must consider the appropriateness of the fit between the end user (human) and the design of the equipment and task being performed and contain at least five (5) peer-reviewed journal articles to support your writing (i.e. use the journal articles from the Assessment 1 related to Physical Ergonomics research repository and elsewhere).

### Assessment Due Date

Week 7 Thursday (29 Aug 2024) 11:45 pm AEST

### Return Date to Students

Week 9 Friday (13 Sept 2024)

### Weighting

40%

### Assessment Criteria

Your assessment task will be assessed against the depth and accuracy to which you have addressed the following criteria:

1. Identifies the context of the workplace and/or setting and person involved (10%);
2. Describes the actual task and physical movement being assessed supported by a task analysis (10%);
3. Describes the MSD hazard or issues and potential effects which pose a problem (20%);
4. Discusses the assessment results and interprets the MSD assessment risk scores using the two human factors assessment tools being (1) NIOSH and either (2) REBA or RULA (whichever is most appropriate to the task being assessed i.e. full body or upper body (30%);
5. Recommends changes to the task, workplace or environment based on the assessment findings to improve the musculoskeletal functioning of the person performing the task (20%);
6. Presentation, grammar, at least five journal articles and correct Harvard style referencing (10%)

A detailed assessment rubric will be supplied via the Moodle site.

### Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)



**Submission**

Online

**Learning Outcomes Assessed**

- Demonstrate an advanced level knowledge of Human Factors principles and practices across the domains of physical, cognitive, environmental and organisational ergonomics in complex systems
- Apply knowledge of Human Factors to analyse the appropriateness of fit between end user design in relation to equipment and tasks

**Graduate Attributes**

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

## 3 Cognitive Ergonomics Equipment Analysis

**Assessment Type**

Written Assessment

**Task Description**

Your task is to write a report which is an evaluation of an item of equipment or technology with regard to COGNITIVE ERGONOMICS. You are required to conduct an ergonomic evaluation of your chosen item of equipment using a Cognitive Task Analysis and prepare a formal report. The focus of the report will be on both problem identification and solution recommendations including:

1. How the equipment design/introduction does or does not match the cognitive characteristics of the users, including a discussion (key requirement) on the information processing model;
2. How the equipment design/introduction of technology does or does not match organisational psychological system considerations i.e. mental workloads, environment of use considerations, fatigue management, teamwork, job-fit concepts and safety issues;
3. Other identified problems (i.e. human error) identified from a cognitive task analysis and any other further issues for consideration;
4. Design recommendations (solutions to problems) for improving the match between the cognitive characteristics of the users and the design of the equipment.

Your report should be no more than 2,000 words and include at least ten (10) peer-reviewed journal articles to support your writing and analysis (i.e. use the journal articles from the Assessment 1 Cognitive Ergonomics research repository and elsewhere). Your report should also cover the context in which the equipment is placed within the organisation. Reports must be submitted as Word documents, not pdf.

**Assessment Due Date**

Week 12 Friday (4 Oct 2024) 11:45 pm AEST

**Return Date to Students**

Review/Exam Week Friday (11 Oct 2024)

**Weighting**

40%

**Assessment Criteria**

Assessment is based on how well the report matches and addresses the following assessment criteria:

- How the equipment design/introduction does or does not match the cognitive characteristics of the users; and answers must include a discussion on the information processing model (20%)
- How the equipment design/introduction of technology does or does not match organisational psychological system considerations i.e. mental workloads, fatigue management, teamwork, job-fit concepts and safety issues (20%)
- Other problems (i.e. human error) identified from the task analysis or any other issues for consideration (20%)
- Design recommendations (solutions to problems) for improving the match between the cognitive characteristics of the users and the design of the equipment (30%)
- Professional report format, and accurate grammar, spelling and Harvard style referencing (10%).

A detailed marking rubric will be provided via the Moodle site during the term.

**Referencing Style**

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Evaluate the contribution of cognitive ergonomics in the assessment of equipment design and the introduction of new technology in complex systems
- Discuss how the concepts of organisational job design relate to psychological considerations including mental workloads, fatigue management, team work and job-fit concepts in systems theory and its relationship to safety

**Graduate Attributes**

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

## 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