



# SAFE20017 Human Factors in Complex Systems

## Term 2 - 2018

Profile information current as at 14/05/2024 06:30 am

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 students to the practices and principles of Human Factors and examines the ways that humans function in complex social and organisational safety systems. This unit discusses the core principles of physical, cognitive and organisational ergonomics and provides a base knowledge that students build upon throughout their course. Students 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, team work 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 - 2018

- Distance

#### 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 Student Feedback

##### **Feedback**

Students were critical of the large amount of reading in this unit and would like the content to be reduced by having more information delivered via the Zoom lecture format with readings being recommended rather than mandatory.

##### **Recommendation**

The teaching team to consider reviewing the amount of reading provided to students and try to deliver some key content via the Zoom style lecture. It is recognised however that students undertake extensive foundational readings in the first few weeks of the course and are then required to do less reading as the unit progresses into specific areas. This allows more time for assessment work as it arises later in the unit. Students are advised of this flow in the delivery of content but generally sometimes sense that there is too much reading.

#### Feedback from Student Feedback

##### **Feedback**

Students liked the Zoom style lectures to add further content and knowledge building across the weeks.

##### **Recommendation**

The teaching team continue to support student learning with a weekly Zoom lecture and catch up session for students.

## 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

 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
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	○	○	○	○	○
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 - Group Discussion - 20%	○	○	○	○	○	○	○	
2 - Written Assessment - 40%	○	○	○	○	○			
3 - Written Assessment - 40%	○	○	○	○	○			

## Textbooks and Resources

### Textbooks

SAFE20017

#### Prescribed

#### Human Factors in Simple and Complex Systems

Edition: 2nd (2008)

Authors: Proctor, R & Van Zandt, T

CRC Press Taylor & Francis

Boca Raton , FL , USA

ISBN: ISBN 9878-0-8058-4119-0

Binding: Hardcover

[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

**Karen Klockner** Unit Coordinator

[k.klockner@cqu.edu.au](mailto:k.klockner@cqu.edu.au)

## Schedule

### Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Introduction The Discipline of Human Factors / Ergonomics	Prescribed Readings Supplied via Moodle Text book chapter 1, pp. 3-23	Weekly Zoom Lecture and Catch Up

### Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
The Discipline of Human Factors / Ergonomics • Task Analysis	Prescribed Readings Supplied via Moodle Text book, chapter 3, pp. 69-70 Task Analysis	Weekly Zoom Lecture and Catch Up Complete your Assessment 1 Group Discussion posts on the Discipline of Human Factors / Ergonomics

### Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Physical Ergonomics 1 • Anthropometrics • Workspace Design	Prescribed Readings Supplied via Moodle Text book chapter 16, pp. 433-445 Text book chapter 16, pp. 455-465	Weekly Zoom Lecture and Catch Up

### Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Physical Ergonomics 2 <ul style="list-style-type: none"> <li>• Hand Tools</li> <li>• Manual Handling - NIOSH, RULA, REBA</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 16, pp. 445-451 Text book chapter 16, pp. 451-455	Weekly Zoom Lecture and Catch Up
<b>Week 5 - 06 Aug 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Cognitive Ergonomics 1 <ul style="list-style-type: none"> <li>• Human Information Processing</li> <li>• Memory and Retention</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 4, pp. 81-87 Text book chapter 10, pp. 261-287	Weekly Zoom Lecture and Catch Up Complete your Assessment 1 Group Discussion posts on Physical Ergonomics
<b>Vacation Week - 13 Aug 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
<b>Week 6 - 20 Aug 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Cognitive Ergonomics 2 <ul style="list-style-type: none"> <li>• Displays</li> <li>• Mental Workload</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 8, pp. 193-226 Text book chapter 9, pp. 229-259	Weekly Zoom Lecture and Catch Up
<b>Week 7 - 27 Aug 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Cognitive Ergonomics 3 <ul style="list-style-type: none"> <li>• Decision Making</li> <li>• Skill Acquisition</li> <li>• Cognitive Task Analysis</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 11, pp. 303-314 Text book chapter 12, pp. 315-337	Weekly Zoom Lecture and Catch Up <b>Physical Ergonomics Manual Task Analysis</b> Due: Week 7 Monday (27 Aug 2018) 10:00 am AEST
<b>Week 8 - 03 Sep 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Organisational Ergonomics 1 <ul style="list-style-type: none"> <li>• Human Error and Reliability</li> <li>• Fatigue</li> <li>• Drugs</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 3, pp. 53-65 Text book chapter 18, pp. 508-513	Weekly Zoom Lecture and Catch Up Complete your Assessment 1 Group Discussion posts on Cognitive Ergonomics
<b>Week 9 - 10 Sep 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Organisational Ergonomics 2 <ul style="list-style-type: none"> <li>• Human-Machine Interaction</li> <li>• Designing for End Users</li> </ul>	Prescribed Readings Supplied via Moodle Text book chapter 13, pp. 341-365	Weekly Zoom Lecture and Catch Up
<b>Week 10 - 17 Sep 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Environmental Ergonomics	Prescribed Readings Supplied via Moodle Text book chapter 17, pp. 467-497	Weekly Zoom Lecture and Catch Up
<b>Week 11 - 24 Sep 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Human Factors Tools, Principles and Practice	Prescribed Readings Supplied via Moodle Text book chapter 19, pp. 531-554	Weekly Zoom Lecture and Catch Up Complete your Assessment 1 Group Discussion posts on Organisational or Environmental Human Factors
<b>Week 12 - 01 Oct 2018</b>		
Module/Topic	Chapter	Events and Submissions/Topic

Human Factors Unit Review

Weekly Zoom Assessment Help and Catch Up  
**Human Factors Group Discussions**  
Due: Week 12 Monday (1 Oct 2018) 10:00 am AEST  
**Cognitive Ergonomics Equipment Analysis** Due: Week 12 Monday (1 Oct 2018) 10:00 am AEST

#### Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
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#### Exam Week - 15 Oct 2018

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

Student's distance learning will be supported by a recorded non-compulsory (evening) weekly Zoom session which will encompass a mini lecture covering the material being presented for the week and allows time for a catch up/chat/assessment help session.

## Assessment Tasks

### 1 Human Factors Group Discussions

#### Assessment Type

Group Discussion

#### Task Description

Assessment 1 will see all students contribute towards a Human Factors Research Database on the Moodle site which can then be used by all students as they complete their assessments 2 and 3.

You will be required to post four (4) contributions of a research journal articles you have found, one for each of the following four topic discussion groups which are headed:-

1. The Discipline of Human Factors / Ergonomics (do your post by week 3)
2. Physical Ergonomics (do your post by week 5);
3. Cognitive Ergonomics (do your post by week 7);
4. Organisational or Environmental Ergonomics (do your post by week 11).

Your post should briefly inform the other students about the journal article, what the research was about and what the findings were.

You should keep your post to around 150 words and you should not cite a journal article which someone else has already done. You should post the correct reference for the article so that other students can find it, should they wish to read it in full. This exercise is intended to give all students a brief overview of some of the research being conducted in the Human Factors/Ergonomics area across these four areas and serve as a good starting point for the other assessments you will do.

You are then also required to post four (4) replies (one for each topic discussion group) to other students' journal article posts. You are required to talk about your view of the research article or notes of interest.

The end result is that you will have made eight (8) contributions, two posts in each of the four discussion group areas listed above, being four (4) journal article posts and four (4) reply posts. Your contributions MUST pertain to the subject matter and ADD to the human factors area under discussion. Your posts must be completed as per the time frame above.

#### Assessment Due Date

Week 12 Monday (1 Oct 2018) 10:00 am AEST

#### Return Date to Students

Review/Exam Week Monday (8 Oct 2018)

#### Weighting

20%

#### Assessment Criteria

The key assessment criteria used will be

1. Your genuine participation and research ability demonstrated by your 4 journal article posts (10%); and
  2. Your contribution to the students' body of knowledge in the area of Human Factors and Ergonomics demonstrated by your 4 replies to other students within the Moodle learning environment (10%).
- A detailed marking rubric will be provided via the Moodle site during term.

### Referencing Style

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

### Submission

Online

### Submission Instructions

This assessment will be marked via a review of your posts on the Moodle site and therefore requires no other formal submission of assessment paperwork for marking.

### 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.
- 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.
- 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 (1) NIOSH 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, therefore, be used one of which must be NIOSH. The other tool must 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;
3. Describes the MSD hazard or issues and potential effects which pose a problem;
4. Assesses the MSD risk score using two human factors or ergonomics tools being (1) NIOSH and (2) REBA or RULA (whichever is most appropriate to the task being assessed i.e. full body or upper body; and
5. Recommends changes based on the assessment findings for MSD human factors improvements to the task and workplace or other environment.

Your report 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 Physical Ergonomics research repository and elsewhere) .

### Assessment Due Date

Week 7 Monday (27 Aug 2018) 10:00 am AEST



**Return Date to Students**

Week 9 Monday (10 Sept 2018)

**Weighting**

40%

**Assessment Criteria**

Your assessment task will be assessed against the following criteria:

1. Identifies context of workplace and/or setting and person involved (10%);
2. Describes the actual task and physical movement being assessed (10%);
3. Describes the MSD hazard or issues and potential effects which pose a problem (20%);
4. Assesses the MSD risk score using two human factors or ergonomics tools being (1) (NIOSH and (2) REBA or RULA (whichever is most appropriate to the task being assessed i.e. full body or upper body (25%);
5. Recommends changes based on the assessment findings for MSD human factors improvements to the task or workplace (25%);
6. Presentation, grammar, five journal articles and correct Harvard style referencing (10%)

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

**Referencing Style**

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

**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 and you must include a discussion 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, 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; and
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 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.

**Assessment Due Date**

Week 12 Monday (1 Oct 2018) 10:00 am AEST

**Return Date to Students**

Exam Week Monday (15 Oct 2018)

**Weighting**

40%

**Assessment Criteria**

Assessment is based on how well the report matches and addresses the assessment criteria and will be marked as follows:

1. 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 (25%);
  2. 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%);
  3. Other problems (i.e. human error) identified from the task analysis or any other issues for consideration (20%);
  4. Design recommendations (solutions to problems) for improving the match between the cognitive characteristics of the users and the design of the equipment (25%); and
  5. Correct use of grammar, spelling and Harvard style referencing (10%).
- A detailed marking rubric will be provided via the Moodle site during the term.

**Referencing Style**

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

**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.
- 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

## 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