MONASH University

Unit Guide

ECE3091
Engineering design

Semester 2, 2017

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Unit handbook information

Synopsis

This unit extends the level of complexity of electronic design by integrating and applying knowledge from a number of second year units. Students will use knowledge from linear and non-linear electronics, computer engineering and communications engineering, to tackle a group project, applying project management skills, and extending their experience of working in groups. The project will extend the design processes introduced in the earlier units to a larger, more complex, and less constrained situation. The project will be complemented by lectures in project management, including working with teams, project management tools and techniques, and written and verbal communication. Frameworks for analysing the life cycles of systems are introduced. Tools and techniques to aid decision-making are provided.

Mode of delivery

Clayton (Day)
Malaysia (Day)

Workload requirements

2 hours lectures, 3 hours laboratory and practice classes and 6 hours of private study per week

Unit relationships

Prerequisites

(ECE2041 or ECE3141) and (ECE2061 or ECE2131) and ECE2072 and (ECE2071 or (FIT1029 and FIT1040))

Prohibitions

ECE3905, TEC3191, TRC3000

Co-requisites

None

Chief Examiner(s)

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Unit Coordinator(s)

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Section A: For Clayton students

Academic Overview

Engineers Australia Stage 1 competencies

The Engineers Australia Policy on Accreditation of Professional Engineering Programs requires that all programs ensure that their engineering graduates develop to a substantial degree the stage 1 competencies. Listed below are the activities in this unit that will help you to achieve these competencies.

Note: that not all stage 1 competencies are relevant to each unit.

Stage 1 competencies	Activities used in this unit to develop stage 1 competencies
PE1.1 Knowledge of science and engineering fundamentals	Teaching material is basic mechanical, electrical and electronic systems support this
PE1.2 In-depth technical competence in at least one engineering discipline	Examples of complicated mechatronic systems and project work support this.
PE1.3 Techniques and resources	IT tools such as PCB designer, FPGA software, CAD tools, etc are widely adapted
PE1.4 General knowledge	As well as thorough understanding the area of their contribution to the project they will also need to develop a general knowledge of the overall project structure and aims. Evaluation of risks and impact on society must be addressed in the design document. Ethical considertions regarding safety are a major concern in this design unit.
PE2.1 Ability to undertake problem identification, formulation, and solution	The students are required to develop a requirements specification based on discussions with the supervisor and industrial partner (the "customer"). Possible solutions should be compared at an early stage. To develop an optimum solution, students are expected to cast the problem into an engineering formalism suitable for that sub-discipline, then apply approriate solution techniques. The students are expected to demonstrate that the solution satisfies the requirement specification be devising and conducting an appropriate test and evaluation regime and demonstrate the efficacy of their solution.

Stage 1 competencies	Activities used in this unit to develop stage 1 competencies
PE2.2 Understanding of social, cultural, global, and environmental responsibilities and the need to employ principles of sustainable development	The discussion of mechatronic systems supports this. The essential nature of mechatronic systems is to find more economic solutions to problems in all different areas.
PE2.3 Ability to utilise a systems approach to complex problems and to design and operational performance	Integrated mechatronic design approach will be discussed.
PE2.4 Proficiency in engineering design	Student project supports this.
PE2.5 Ability to conduct an engineering project	Student project supports this.
PE2.6 Understanding of the business environment	The students are required to develop a requirements specification based ondiscussions with the supervisor and industrial partner(the "customer").
PE3.1 Ability to communicate effectively, with the engineering team and with the community at large	Students work on the project in teams and are required to interact effectively witht the other team members, participate in oralpresentations and communicateeffectively in written reports. The project work requires students to access and understand technical documentation on electronic and sensor components. They must also document all aspects of their project work.
PE3.2 Ability to manage information and documentation	Project documentation and data management support this.
PE3.3 Capacity for creativity and innovation	Students are supposed to come up with new ideas and innovation to their projects for better performance.
PE3.4 Understanding of professional and ethical responsibilities, and commitment to them	Lectures and demonstrator guidance support this

Stage 1 competencies	Activities used in this unit to develop stage 1 competencies
PE3.5 Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member	The project is team orientated and each member is required to take charge of a different element of the design. The member will then need to interact with other team members to ensure that they understand how their contribution interfaces with the rest of the project
PE3.6 Capacity for lifelong learning and professional development	Project work is designed to encourage and inspire students to use their talents and to explore their understanding of a given area of engineering. The project seeks to develop new knowledge and expand human understanding. The project is presented as the first step on the path of lifelong learning.
PE3.7 Professional attitudes	Lecture material and team base project will encourage this

Teaching and learning method

Teaching approach is mainly laboratory-based project work and classes, case-based teaching, workshops, and research activities through team based problem solving.

Learning outcomes

1. Apply in-depth electrical and computer systems engineering knowledge to compose and assess possible solutions for sub-problems in a complex engineering project, and select suitable solutions based on available data.
2. Analyse and identify possible causes for practical problems encountered in the complex engineering project, and solve these problems through appropriate research methods.
3. Design a sustainable prototype according to specified project constraints whilst complying with health and safety requirements.
4. Demonstrate commitment to carry out the design project as an individual and as a member of a team
5. Demonstrate effective project management skills to carry out a project in an organised manner.
6. Generate written reports and oral presentations to communicate the outcomes of the project.

Your feedback to us

One of the formal ways students have to provide feedback on teaching and their learning experience is through the Student Evaluation of Teaching and Units (SETU) survey. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied with and areas for improvement.

Previous student evaluations of this unit

In response to previous SETU results of this unit, the following changes have been made:

The unit is one of the most loved one by ECSE students. The student usually lack time management in completing the Robots. Lecturer need to advise the students from the beginning of the unit.

Student feedback has highlighted the following strength(s) in this unit:

Opportunity for students to learn many new skills including software and CAD design

If you wish to view how previous students rated this unit, please go to:
https://unitevaluations.connect.monash.edu.au/unitevaluations/index.jsp

Unit schedule - Clayton campus

Week	Some of the work to be done	Comments	To be submitted or assessed
1	Introduction, safety talk, parts demonstration, group selection and assigning of a team leader, room access, more… (Please see moodle site)		Quiz's Weekly progress report
2	Planning and construction		Quiz's Weekly progress report Submit Project proposal
3	Construction		Quiz's Weekly progress report Submit robot arm design Submit robot gripper design
4	Construction		Quiz's Weekly progress report
5	Construction		Quiz's Weekly progress report
6	Construction.		Quiz's Weekly progress report Test
7	Construction.		Quiz's Weekly progress report Preliminary competition

8	Construction.		Quiz's Weekly progress report
9	Construction.		Quiz's Weekly progress report
10	Construction.		Quiz's Weekly progress report
11	Construction		
12	End of unit L		Peer assessment form Final competition Robot marking Submit video "Clayton" (Project presentation) Submit final report Robot to be pulled down and parts returned Student evaluation of unit to be completed.

Assessment requirements

Assessment summary

Continuous assessment: 40%
Final project assessment: 60%
Students are required to achieve at least (i) 45% in the continuous assessment component (weekly progress reports, mid-semester project assessment and team presentation), (ii) 45% in the final project assessment component and (iii) an overall mark of 50% to achieve a pass grade in the unit. Students failing to achieve this requirement will be given a maximum of 45% in the unit.

Assessment task	Value	Due date
Quiz's	4%	Various dates during semester
Weekly progress report	6%	Weekly from week 2
Mid semester test	5%	Week 6
Project proposal	5%	Week 2
Preliminary competition	10%	See moodle for details
Team presentation (Video)	10%	Week 12
Final report	20%	Week 12
Final Competition	25%	Week 12
Robot construction	10%	Week 12
Peer Assessment	5%	See moodle for details

Hurdle requirements

Students are required to achieve at least 45% in the total continuous assessment component (quizzes, weekly progress reports, project proposal, preliminary competition, test and project presentation) and at least 45% in the final project assessment component (robot construction, final design competition, final report and peer assessment) and an overall mark of 50% to achieve a pass grade in the unit. Students failing to achieve this requirement will be given a maximum of 45% in the unit.

Assessment tasks

Assessment title: Quiz's
Mode of delivery: On line
Details of task: See moodle for details
Release dates (where applicable): Week 2 onwards
Word limit (where applicable): Not applicable.
Due date: Various dates during semester
Value: 4%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Individual
Criteria for marking: Not applicable.
Additional remarks: Not applicable.

Assessment title: Weekly progress report
Mode of delivery: Group orientated (On line)
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Weekly from week 2
Value: 6%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Not applicable.
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Mid semester test
Mode of delivery: On line
Details of task: See moodle for details
Release dates (where applicable): Week 6
Word limit (where applicable): Not applicable.
Due date: Week 6
Value: 5%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Individual

Criteria for marking: Not applicable.
Additional remarks: Not applicable.

Assessment title: Project proposal
Mode of delivery: Written
Details of task: See moodle for details
Release dates (where applicable): Week 1
Word limit (where applicable): Not applicable.
Due date: Week 2
Value: 5%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Preliminary competition
Mode of delivery: In class
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): Not applicable.
Due date: See moodle for details
Value: 10%
Presentation requirements: See moodle for details
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Team presentation (Video)
Mode of delivery: Video
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): Not applicable.
Due date: Week 12
Value: 10%
Presentation requirements: 5 minute video
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Final report
Mode of delivery: Via Moodle
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): 5000
Due date: Week 12
Value: 20%

Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Final Competition
Mode of delivery: In class
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): Not applicable.
Due date: Week 12
Value: 25%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: Not applicable.

Assessment title: Robot construction
Mode of delivery: In class
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): Not applicable.
Due date: Week 12
Value: 10%
Presentation requirements: Not applicable.
Hurdle requirements (where applicable): Not applicable.
Individual assessment in group tasks (where applicable): Group
Criteria for marking: See moodle for details
Additional remarks: N/A

Assessment title: Peer Assessment
Mode of delivery: On line
Details of task: See moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: See moodle for details
Value: 5%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): See moodle for details
Criteria for marking: See moodle for details
Additional remarks: See moodle for details

Examination(s)

Section B: For Malaysia students

Academic Overview

Program Education Objectives
The Electrical and Computer Systems engineering discipline expects to produce graduates, who are:
1. competent in Electrical and Computer Systems engineering
2. responsible and effective global citizens
3. leaders in their chosen profession or society at large.

Program Outcomes
The Electrical and Computer Systems engineering discipline has developed a set of Program Outcomes (POs) for all of its graduates based on the competencies required by the Malaysian Engineering Accreditation Council.

Program Outcomes (POs)	Activities used in this unit to develop POs, achievement of Bloom's domains and complex problem solving
PO1 **Electrical and Computer Systems Engineering Knowledge:** Apply knowledge of mathematics, natural science, engineering fundamentals and specialisation in Electrical and Computer Systems engineering to the solution of complex engineering problems	Cognitive: Since this is a capstone unit for ECSE, students will need to apply the knowledge they have gathered in the past units in order to come up with solutions for the various problems encountered in the project. The technical depth that students have managed to exhibit in the various aspects of the project will be tested in the quizzes, project proposal, project presentation and final report.
PO2 **Problem Analysis:** Identify, formulate, survey research literature and analyse complex Electrical and Computer Systems engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences	Cognitive: Students are required to come up with possible solutions based on the project requirements and these solutions should be compared at an early stage. To develop an optimum solution, students are expected to cast the problem into an engineering formalism suitable for that sub-discipline, then apply appropriate solution techniques. The students are expected to demonstrate that the solution satisfies the requirements of the project by devising and conducting an appropriate test and evaluation regime and demonstrate the efficacy of their solution.
PO3 **Design/Development of Solutions:** Design solutions for complex Electrical and Computer Systems engineering problems and design systems, components or processes that meet specified needs.	Cognitive: The project requires development of solutions in a number of areas such as software programming for autonomous control of the robot, sensor electronics and designing the mechanical structure of the robot. Psychomotor: Students will be required to check the functioning of their robots in real-time using software such as termite, construct and test electronic circuits and perform custom machining of the mechanical parts of the robot.

Program Outcomes (POs)	Activities used in this unit to develop POs, achievement of Bloom's domains and complex problem solving
PO4 **Research-based Investigation:** Conduct investigations of complex Electrical and Computer Systems engineering problems using research-based knowledge and research methods including design of experiments, (analysis and interpretation of data, and synthesis of information to provide valid conclusions.	Cognitive: Students will have to troubleshoot practical problems encountered with the robot during its functioning through survey of research literature such as component datasheets, designing specific test environments for the robot, analyze data obtained from the tests conducted and reach valid conclusions.
PO5 **Modern Tool Usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex Electrical and Computer Systems engineering problems, with an understanding of the limitations	Cognitive: The programs developed need to be tested for their functionality, and the 3-D printed parts of the robot needs to be tested and improved for precision in order to ensure smooth functioning of the robot, while complying to the required specifications of the project. Psychomotor: Students will need to convert algorithms into a computer programs through an understanding of software programming concepts, convert a rough sketch of the mechanical construction of the robot into precise CAD drawings for 3-D printing and also use PCB designing tools for electronic circuitry.
PO6 **Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex Electrical and Computer Systems engineering problems	Affective: Students will have to follow proper safety procedures when operating laboratory equipment used for building and testing the electronic circuitry, and mechanical construction of the robot.
PO7 **Environment and Sustainability:** Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex Electrical and Computer Systems engineering problems in environmental contexts.	Cognitive: The students should optimize the electronic circuitry and programming techniques to design the robot such that it can operate using minimal power. These details need to provided in the final report. Affective: Students need to explain on how the robot has been designed to operate based on minimum power before the robot enters the arena for the final design competition.
PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.	Affective: Students have to design the robot based on the specified project constraints. The robot must adhere to all the project rules in order to enter the arena for the final design competition.

Program Outcomes (POs)	Activities used in this unit to develop POs, achievement of Bloom's domains and complex problem solving
PO9 **Communication:** Communicate effectively on complex Electrical and Computer Systems engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	Affective: Students work on the project in teams and are required to interact effectively with the other team members, participate in oral presentations and communicate effectively in written reports. The project work requires students to access and understand technical documentation on electronic and sensor components. They must also document all aspects of their project work.
PO10 **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings	Affective: The project is team oriented and each member is required to take charge of a different element of the design. The member will then need to interact with other team members to ensure that they understand how their contribution interfaces with the rest of the project.
PO11 **Lifelong Learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change	Affective: Project work is designed to encourage and inspire students to use their talents and to explore their understanding of a given area of engineering. The project seeks to develop new knowledge and expand human understanding.Students will need to refer datasheets of electronic and software components used in the project and understand their functionality. This project is presented as the first step on the path of lifelong learning.
PO12 **Project Management and Finance:** Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to manage projects	Cognitive: Students are supposed to provide a description of the team profile and role of team members in the project proposal and final report. Further, a proposed project budget and timeline needs to be provided in the project proposal, and the actual budget and project timeline needs to be provided in the final report highlighting any reasons for major deviations. The final report should also contain details of the project planning process using techniques work breakdown structure, responsibility matrix and critical path identification. Affective: Students should have a project team meeting at least once a week to discuss on the status of tasks in which the team was involved during the particular week and also come up with a plan for the following week's project activities. The weekly progress reports should summarize these aspects.

Teaching and learning method

Teaching approach is mainly laboratory-based project work and classes, case-based teaching, workshops, and research activities through team based problem solving.

Learning outcomes

1. Apply in-depth electrical and computer systems engineering knowledge to compose and assess possible solutions for sub-problems in a complex engineering project, and select suitable solutions based on available data.
2. Analyse and identify possible causes for practical problems encountered in the complex engineering project, and solve these problems through appropriate research methods.
3. Design a sustainable prototype according to specified project constraints whilst complying with health and safety requirements.
4. Demonstrate commitment to carry out the design project as an individual and as a member of a team
5. Demonstrate effective project management skills to carry out a project in an organised manner.
6. Generate written reports and oral presentations to communicate the outcomes of the project.

OBE requirements to learning outcomes (LOs)

Learning Outcomes (LOs) for Outcome Based Education (OBE) requirements	*Handbook Learning Outcomes (LOs)*
LO1. Apply in-depth electrical and computer systems engineering knowledge to propose solutions for complex engineering project	**LO1 - LO4.** Apply in-depth electrical and computer systems engineering knowledge to compose and assess possible solutions for sub-problems in a complex engineering project, and select suitable solutions based on available data.
LO2. Compose and assess various possible solutions for the subproblems in the project and select suitable solution based on the available data	
LO3. Construct programs for the microcontroller integrated to the prototype and evaluate the constructed programs using suitable software development tools such that the prototype satisfactorily performs the required tasks	
LO4. Research and use appropriate resources such as electronic component datasheets in order to compose relevant information for the project	
LO5. Analyse and identify possible causes for practical problems encountered in the complex engineering project	**LO5 - LO6.** Analyse and identify possible causes for practical problems encountered in the complex engineering project, and solve these problems through appropriate research methods.
LO6. Solve practical problems in complex engineering constructions through application of appropriate research methods	

Learning Outcomes (LOs) for Outcome Based Education (OBE) requirements	*Handbook Learning Outcomes (LOs)*
LO7. Adapt the design of the prototype to enable its construction using techniques that comply with relevant health and safety requirements applicable to the project	**LO7 - LO9.** Design a sustainable prototype according to specified project constraints whilst complying with health and safety requirements.
LO8. Assess the power consumption of the design and thereby, adapt the prototype construction to operate using minimal power	
LO9. Formulate a multidisciplinary design according to the specified project rules and constraints	
LO10. Exhibit loyalty to carry out the design project as an individual and as member of a team	**LO10.** Demonstrate commitment to carry out the design project as an individual and as a member of a team
LO11. Demonstrate effective project management skills to organise the project for seamless execution and timely completion	**LO11.** Demonstrate effective project management skills to carry out a project in an organised manner.
LO12. Express the project in form of written reports and oral presentation	**LO12.** Generate written reports and oral presentations to communicate the outcomes of the project.

Relationship between unit learning outcomes and program outcomes

No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	√											
LO2			√									
LO3					√							
LO4											√	
LO5		√										
LO6				√								
LO7						√						
LO8							√					
LO9								√				
LO10										√		
LO11												√
LO12									√			

Your feedback to us

One of the formal ways students have to provide feedback on teaching and their learning experience is through the Student Evaluation of Teaching and Units (SETU) survey. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied with and areas for improvement.

Previous student evaluations of this unit

In response to previous SETU results of this unit, the following changes have been made:

The unit is one of the most loved one by ECSE students. The student usually lack time management in constructing the robot. Lecturer need to advise the students from the beginning of the unit.

A workshop on Solid Works CAD software will be organized early in the semester in order to get the students familiarized on CAD drawing for 3D printing.

Student feedback has highlighted the following strength(s) in this unit:

Opportunity for students to learn how a robot works through an integration of software, electronics and mechanical aspects.

If you wish to view how previous students rated this unit, please go to:
https://emuapps.monash.edu.au/unitevaluations/index.jsp

Unit schedule - Malaysia campus

Week	Lecture Activities	Some of the work to be done	To be submitted or assessed
1	Introduction to the unit	1. Team formation, safety induction, distribution of the kits. 2. Robot construction + Planning 3. Write the risk assessment sheet, and begin brainstorming.	Quiz
2	Methodical design/debug, Teamwork: forming groups, meetings, conflict resolution strategies	1. Solder the switches, pins and sockets of the PSoC 5LP prototyping kit, and start learning how to use it. 2. Robot construction + Planning	Quiz Weekly Progress Report Project Proposal
3	Mechanical considerations, Project Management 1: Introduction to Planning and Scheduling	Robot construction + Planning	Quiz Weekly Progress Report
4	Control and practicalities, Suitable sensors	Robot construction + Strategic Planning and Implementation	Quiz Weekly Progress Report Peer Assessment
5	Documentation and referencing	Robot construction + Strategic Planning and Implementation + Testing	Quiz Weekly Progress Report
6	Motors and electronics	Robot construction + Strategic Planning and Implementation + Testing	Quiz Weekly Progress Report
7	Project Management 2: Planning, scheduling, project management techniques and software	Robot construction + Testing .	Quiz Weekly Progress Report Preliminary competition
8	Report writing	Robot construction + Testing	Quiz Weekly Progress Report
9	Presentation skills	Testing + Design and code optimization	Quiz Weekly Progress Report
10	Interaction		Quiz

Week	Lecture Activities	Some of the work to be done	To be submitted or assessed
		Testing + Design and code optimization	Weekly Progress Report Test
11	Team Presentation	Testing + Design and code optimization	Weekly Progress Report
12	Team Presentation		Peer Assessment Robot Construction Marking Final Design Competition Final Report

Assessment Summary

Continuous assessment: 40%
Final project assessment: 60%
Students are required to achieve at least (i) 45% in the continuous assessment component (weekly progress reports, mid-semester project assessment and team presentation), (ii) 45% in the final project assessment component and (iii) an overall mark of 50% to achieve a pass grade in the unit. Students failing to achieve this requirement will be given a maximum of 45% in the unit.

Assessment task	Value	Due date
1. Quizzes	4%	Various dates during the semester
2. Weekly Progress Report	6%	Week 2 - Week 11
3. Project Proposal	5%	Week 2
4. Preliminary Competition	10%	Week 7
5. Test	5%	Week 10
6. Project Presentation	10%	Week 11 or Week 12
8. Robot construction	10%	Week 12
8. Final Design Competition	25%	Week 12
9. Final Report	20%	Week 12
10. Peer Assessment	5%	Week 4 and Week 12

Hurdle requirements

Students are required to achieve at least 45% in the total continuous assessment component (quizzes, weekly progress reports, project proposal, preliminary competition, test and project

presentation) and at least 45% in the final project assessment component (robot construction, final design competition, final report and peer assessment) and an overall mark of 50% to achieve a pass grade in the unit. Students failing to achieve this requirement will be given a maximum of 45% in the unit.

Bloom's Taxonomy:
Three domains of educational activities have been identified under the general taxonomy known as Bloom's.

- **Cognitive**: mental skills (*Head*)
- **Affective**: growth in feelings or emotional areas (*Heart*)
- **Psychomotor**: manual or physical skills (*Hand*)

The *cognitive* domain involves knowledge and the development of intellectual skills. This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills.

The *affective* domain includes the attitudes with which someone deals with things emotionally, such as feelings, values, appreciation, enthusiasms and motivations.

The *psychomotor* domain includes physical movement, coordination, and use of the motor-skill areas. Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.

Key for the LO-assessment relationship table above:

Cognitive

C1	C2	C3	C4	C5	C6
Knowledge: Remembers previously learned material	**Comprehension:** Grasps the meaning of material (lowest level of understanding)	**Application:** Uses learning in new and concrete situations (higher level of understanding)	**Analysis:** Understands both the content and structure of material	**Synthesis:** Formulates new structures from existing knowledge and skills	**Evaluation:** Judges the value of material for a given purpose

Psychomotor

P1	P2	P3	P4	P5	P6	P7
Perception: Senses cues that guide motor activity	**Set:** Is mentally, emotionally and physically ready to act	**Guided Response:** Imitates and practices skills, often in discrete steps	**Mechanism:** Performs acts with increasing efficiency, confidence and proficiency	**Complete Overt Response:** Performs automatically	**Adaption:** Adapts skill sets to meet a problem situation	**Organisation:** Creates new patterns for specific situations

Affective

A1	A2	A3	A4	A5
Receiving: Selectively attends to stimuli	**Responding:** Responds to stimuli	**Valuing:** Attaches value or worth to something	**Organisation:** Conceptualises the value and resolves conflict between it and other values	**Internalising:** Integrates the value into a value system that controls behaviour

Relationship between Assessments and OBE Learning Outcomes (LOs)

Assessment	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
Quizzes	C3											
Weekly Progress Report											A4	
Project Proposal	C3										C3	A3
Preliminary Competition						C3						
Test		P7	C6, P7	A3	C4					A3		
Project Presentation	C3	C6								A3		A3
Robot Construction							A4	A4	A4			
Final Design Competition						C3						
Final Report	C3	C6						C6			C3	A3
Peer Assessment										A3		

Relationship between Assessments and Complex Problems /Activities

Assessment	Complex Problems (CP)							Complex Activities (CA)				
	WP1	WP2	WP3	WP4	WP5	WP6	WP7	EA1	EA2	EA3	EA4	EA5
Quizzes	√											
Weekly Progress Reports								√	√			
Project Proposal	√	√	√	√			√	√	√	√		√
Preliminary Competition	√	√	√	√			√	√	√	√		√
Test	√	√	√	√			√	√	√	√		√
Project Presentation	√	√	√	√			√	√	√	√		√
Robot Construction	√	√	√	√			√	√	√	√	√	√
Final Design Competition	√	√	√	√			√	√	√	√		√
Final Report	√	√	√	√			√	√	√	√	√	√
Peer Assessment	√	√	√	√			√	√	√	√		√

Complex Problems (CP) - attribute descriptions

Attribute Code	Attribute Description
WP1	Depth of Knowledge Required
WP2	Range of conflicting requirements
WP3	Depth of analysis required
WP4	Familiarity of issues
WP5	Extent of applicable codes
WP6	Extent of stakeholder involvement and conflicting requirements
WP7	Interdependence

Complex Activities (CA) - attribute descriptions

Attribute Code	Attribute Description
EA1	Range of resources

Attribute Code	Attribute Description
EA2	Level of interactions
EA3	Innovation
EA4	Consequences to society and the environment
EA5	Familiarity

Assessment requirements

Assessment tasks

Assessment title: Quizzes
Mode of delivery: Online on Moodle
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2 onwards
Word limit (where applicable): N/A
Due date: Various dates during the semester
Value: 4%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Individual
Criteria for marking: N/A
Additional remarks: N/A

Assessment title: Weekly Progress Report
Mode of delivery: To be submitted on Moodle
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Weekly from Week 2 onwards
Value: 6%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Project Proposal
Mode of delivery: To be submitted on Moodle
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 1
Word limit (where applicable): N/A

Due date: Week 2
Value: 5%
Presentation requirements: Refer to Moodle for details
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Preliminary Competition
Mode of delivery: At the ECE3091 competition arena
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Week 7
Value: 10%
Presentation requirements: Refer to Moodle for details
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Test
Mode of delivery: Viva-voce during the allocated lab session
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 10
Word limit (where applicable): N/A
Due date: Week 10
Value: 5%
Presentation requirements: Not applicable
Hurdle requirements (where applicable): Not applicable
Individual assessment in group tasks (where applicable): Individual
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Project Presentation
Mode of delivery: Live-presentation during lectures in Week 11 or Week 12
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Week 11 or Week 12
Value: 10%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group (with individual component)
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Robot construction
Mode of delivery: On the final competition day before robot enters arena
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Week 12
Value: 10%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Final Design Competition
Mode of delivery: At the ECE3091 competition arena
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): N/A
Due date: Week 12
Value: 25%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Final Report
Mode of delivery: To be submitted online on Moodle
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 2
Word limit (where applicable): 5000
Due date: Week 12
Value: 20%
Presentation requirements: N/A
Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Group
Criteria for marking: Refer to Moodle for details
Additional remarks: N/A

Assessment title: Peer Assessment
Mode of delivery: Online on CATME
Details of task: Refer to Moodle for details
Release dates (where applicable): Week 12
Word limit (where applicable): N/A
Due date: Week 4 and Week 12
Value: 5%
Presentation requirements: N/A

Hurdle requirements (where applicable): N/A
Individual assessment in group tasks (where applicable): Individual
Criteria for marking: N/A
Additional remarks: N/A

Section C: All students

Returning assignments

Moodle

Resubmission of assignments

Lecturer will advise if there any re-submission is required.

Plagiarism and collusion

Intentional plagiarism or collusion amounts to cheating under Part 7 of the Monash University (Council) Regulations.

Plagiarism: Plagiarism means taking and using another person's ideas or manner of expressing them and passing them off as one's own. For example, by failing to give appropriate acknowledgement. The material used can be from any source (staff, students or the internet, published and unpublished works).

Collusion: Collusion means unauthorised collaboration with another person on assessable written, oral or practical work and includes paying another person to complete all or part of the work. Where there are reasonable grounds for believing that intentional plagiarism or collusion has occurred, this will be reported to the Associate Dean (Education) or delegate,

Referencing requirements

Harvard

IEEE

To build your skills in citing and referencing, and using different referencing styles, see the online tutorial Academic Integrity: Demystifying Citing and Referencing at http://www.lib.monash.edu.au/tutorials/citing/

Assignment submission

Hard Copy Submission:

Assignments must include a cover sheet. The coversheet is accessible via the Monash portal page located at http://my.monash.edu.au under the heading 'Learning and teaching tools'. Please keep a copy of tasks completed for your records.

For Malaysia, you can submit in the pigeon hole with label ‘Dr. Ajay Achath Mohanan” available in Building 2, Level 4 School of IT staff mail box.

Online Submission: If Electronic Submission has been approved for your unit, please submit your work via the Moodle site or other; as directed by your demonstator for this unit.
Please keep a copy of tasks completed for your records.

Feedback to you

Feedback will be provided in following ways

- written comments
- verbal comments
- feedback to the whole class, to groups, to individuals

Learning resources

Monash Library Unit Reading List (if applicable to the unit):
http://readinglists.lib.monash.edu/index.html

Required resources

Students generally must be able to complete the requirements of their course without the imposition of fees that are additional to the student contribution amount or tuition fees. However, students may be charged certain incidental fees or be expected to make certain purchases to support their study. For more information about this, go to Administrative Information for Higher Education Providers: Student Support, Chapter 21, Incidental Fees at: http://www.innovation.gov.au/HigherEducation/TertiaryEducation/ResourcesAndPublications/Pages/default.aspx

Technological requirements

Students must regularly check Moodle and Emails for announcements.

Additional unit costs

A basic set of components will be provided for each group. If students wish to investigate a wider range of sensors/actuators/structural components then they must finance this themselves. The limit of expenditure for additional parts per 4-student team is currently set at RM360.

Other information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at: http://www.policy.monash.edu/policy-bank/academic/education/index.html

Graduate Attributes Policy

http://www.monash.edu/policy-bank/academic/education/course-governance-and-design/course-design-policy

Student Charter

http://www.monash.edu/students/policies/student-charter.html

Student Services

The University provides many different kinds of services to help you gain the most from your studies. Contact your tutor if you need advice and see the range of services available at http://www.monash.edu/students.

Malaysia students go to: http://www.monash.edu.my/Student-services/.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research.
Go to http://www.monash.edu/library or the library tab in http://my.monash.edu.au portal for more information.

For Malaysia students the Library and Learning Commons, Monash University Malaysia Campus, provides a range of services and resources that enable you to save time and be more effective in your learning and research.
Go to http://www.lib.monash.edu.my or the library tab in my.monash portal for more information.

Disability Support Services

Students who have a disability, ongoing medical or mental health condition are welcome to contact Disability Support Services.

Disability Support Services also support students who are carers of a person who is aged and frail or has a disability, medical condition or mental health condition.

Disability Advisers visit all Victorian campuses on a regular basis.

- Website: monash.edu/disability
- Telephone: 03 9905 5704 to book an appointment with an Adviser;
- Email: disabilitysupportservices@monash.edu

- Drop In: Level 1, Western Annexe, 21 Chancellors Walk (Campus Centre) Clayton Campus

At Malaysia campus, for information and referral, telephone: Student Adviser, Student Community Services at 03 55146018 or, drop in at Student Community Services Department, Level 2 Building 2, Monash University Malaysia Campus.