Diploma of Computer Science
Program Structure & Course Outlines

Program Structure

- The Diploma of Computer Science comprises 8 courses taken over three terms of full-time study. Students must complete 48 Units of Credit (UOC). Each course is 6 UOC.
- DPCA1001, DPCA1002 and DPCA1003 are all one course delivered over 1- 3 terms:
- Pre-requisites must be satisfied before selecting any course within the program.
- A core course is one that must be satisfactorily completed to meet the requirements of the program. An elective course is one which must be completed to satisfactorily complete the program and, if relevant, specialisation.
- Students will study a mix of core course and prescribed electives depending on your specialisation

Diploma of Computer Science Sample Program

Course Code	Course Title	UoC	Suggested Enrolment Term	Pre-requisites/ Co-requisites
DPCA1001	Communication and Academic Literacy 1	4	1	
DPMA1013	Mathematics 1A	6	1	
DPCP1091	Introduction to Programming	6	1 or 2	
DPCA1002	Communication and Academic Literacy 2	1	2	DPCA1001 Communication and Academic Literacy 1 *(Pre-requisite)*
DPMA1014	Mathematics 1B	6	2	DPMA1013 Mathematics 1A *(Pre-requisite)*
DPCA1003	Communication and Academic Literacy 3	1	3	DPCA1002 Communication and Academic Literacy (P*re-requisite)*
DPCP1092	Computer System Fundamentals	6	2 or 3	DPCP1091 Introduction to Programming *(Pre-requisite)*
DPCS1093	Software Engineering Fundamentals	2	2 or 3	DPCP1091 Introduction to Programming *(Pre-requisite)*

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Course Code	Course Title	UoC	Suggested Enrolment Term	Pre-requisites/ Co-requisites
CHOOSE 2 OF THE FOLLOWING ELECTIVE COURSES:				
DPEG1071 **DPBA1051** **DPBA1052** **DPPH1021** **DPBH1022**	Introduction to Engineering Design and Innovation OR Molecules, Cells and Gene OR Applied Biomolecular Science OR Physics 1A OR Physics 1B	6	2 or 3	DPMA1013 Mathematics 1A *(Co-requisite)* DPPH1021 Physics 1A *(Pre-requisite)*

Course Outlines

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DPMA1013 Mathematics 1A

Course Description

This course will provide you with a good working knowledge of Calculus and Linear Algebra and will show you how these topics can be applied in interdisciplinary contexts. You will see analytical thinking and problem-solving demonstrated in lectures, and you will have an opportunity to develop your analytical thinking and problem-solving skills in tutorial classes. This course will enhance your ability to solve problems using logical arguments and techniques, which are generic skills that can be applied in multidisciplinary work. The course will also engage you in independent and reflective learning through your homework problems and the Maple computing package. You are encouraged to develop your communication skills through active participation in tutorials, and by writing clear, logical arguments when solving problems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: State definitions as specified in the syllabus.

CLO2: State and prove appropriate theorems.

CLO3: Explain how a theorem relates to specific examples.

CLO4: Apply the concepts and techniques of the syllabus to solve appropriate problems.

CLO5: Prove specific and general results given specified assumptions.

CLO6: Use mathematical and other terminology appropriately to communicate information and understanding.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
7 hours (2 x 2hrs lectures, 2 x 1.5 hrs tutorials)	7 hours	14 hours

Topics included in the Course

Algebra

1 Introduction to Vectors
2 Vector Geometry
3 Complex Numbers
4 Linear Equations and Matrices
5 Matrices

Calculus

1 Sets, inequalities and functions
2 Limits
3 Properties of continuous functions
4 Differentiable functions
5 The mean value theorem and applications
6 Inverse functions
7 Curve sketching
8 Integration
9 Logarithms and exponentials
10 Hyperbolic functions

Computing

1 Getting Started – Maple
2 The Basics- Arithmetic operations; Brackets; Constants and variables
3 Functions
4 Basic Calculus
5 Collections of Expressions
6 Complex Numbers and Equations
7 Plotting
8 Linear Algebra

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Class tests** Two Algebra and two Calculus tests, each covering 2-3 topics and of 35 mins duration.	Year 1, Term 1, Weeks 5, 6, 10, 11	24%	CLO1-6
2. **Mobius online tutorials** Each covers 4 sets of questions on Algebra / Calculus and one question on Maple, an unlimited number of attempts within 2 weeks, best 8 scores of the 11 quizzes count.	Year 1, Term 1, Weekly	12%	CLO1-6
3. **Maple laboratory test** Testing knowledge/use of Maple, 40 min.	Year 1, Term 1, Week 12	4%	CLO4, CLO6
4. **Assignment** Testing Math's writing skills through detailed explanations to 3 different questions, typeset using Equation Editor.	Year 1, Term 1, released in Week 6 and due in Week 10	10%	CLO1-6
5. **Final Exam** Duration of 2.5h, split into an Algebra and Calculus part.	Year 1, Term 1, Exam Period	50%	CLO1-6

DPMA1014 Mathematics 1B

Course Description

This course will provide you with a good working knowledge of Calculus and Linear Algebra, and it will show you how these topics can be applied in interdisciplinary contexts. The illustrative examples used in lectures and the problem-based tutorial classes will help you to further develop and improve your analytical thinking and problem-solving skills. Based on logical arguments and specific techniques, these problem-solving skills are generic and can be applied in multidisciplinary work. The course will also encourage you to develop your communication skills through active participation in tutorials, and by writing clear, logical arguments when solving problems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: State definitions as specified in the syllabus.

CLO2: State and prove appropriate theorems.

CLO3: Explain how a theorem relates to specific examples.

CLO4: Apply the concepts and techniques of the syllabus to solve appropriate problems.

CLO5: Prove specific and general results given specified assumptions.

CLO6: Use mathematical and other terminology appropriately to communicate information and understanding.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
7 hours (2 x 2hrs lectures, 2x 1.5 hrs tutorials)	7 hours	14 hours

Topics included in the Course

Algebra

1. Vector spaces
2. Linear Transformations
3. Eigenvalues and Eigenvectors
4. Probability and Statistics

Calculus

1. Functions of several variables
2. Integration techniques
3. Ordinary differential equations
4. Taylor series
5. Application of integration

Computing

1. Application of integration
2. Further calculus
3. Further linear algebra
4. Geometry
5. Programming in Maple

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Class tests** Two Algebra and two Calculus tests, each covering 1-2 topics and of 35 mins duration.	Year 1, Term 2, Weeks 5, 6, 10, 11	24%	CLO1-6

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Assessment Tasks

2. Mobius online tutorials Each covers 4 questions on Algebra/Calculus and one question on Maple, an unlimited number of attempts within 2 weeks, best 8 scores of the 12 quizzes count.	Year 1, Term 2, Weekly	12%	CLO1-6
3. Maple laboratory test Testing knowledge/use of Maple, 40 min.	Year 1, Term 2, Week 12	4%	CLO4, CLO6
4. Assignment Testing Math's writing skills through detailed explanations to 3 different questions, typeset using Equation Editor.	Year 1, Term 2, released in Week 6 and due in Week 10	10%	CLO1-6
5. Final Exam Duration of 2.5h, split into an Algebra and Calculus part.	Year 1, Term 2, Exam Period	50%	CLO1-6

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DPCP1091 Introduction to Programming

Course Description

This course introduces students to the basics of programming. Topics covered include fundamental programming concepts, the C programming language and use of a C compiler, programming style, program design and organization concepts, program testing and debugging. The course does not assume any previous programming experience. The course aims for students to become proficient in programming using a high-level language, C. By the end of the course, students should be able to construct C programs to solve problems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Understand the core syntax & semantics of the C programming language including types, I/O, arrays, functions, pointers, structs, file manipulation and dynamic memory allocation.

CLO2: Given a problem, solve it by proficiently constructing (designing, testing, debugging) a secure, reliable, and correct C program.

CLO3: Understand & employ fundamental data structures including stacks, queues and linked lists.

CLO4: Use Linux and Unix-like operating systems to develop and test software.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (1 x 2hrs lectures, 2 x 1hr lectures, 1x 1 hr tutorials, 1 x 2hrs lab, 1 x 1hr lab)	8 hours	16 hours

Topics included in the Course

Unit 1: Introduction to course/Linux/C; data types; variables, simple I/O, expressions, If Statements

Unit 2: Structs, Loops and Code Style

Unit 3: Functions and Arrays

Unit 4: Memory and Pointers

Unit 5: Debugging, Strings, Character functions and multi-file projects

Unit 6: Dynamic memory allocation and extra C (for loops, pre/post increment, multi-file compilation), Linked Lists

Unit 7: Abstract Data Types, including stacks and queues

Unit 8: Recursion including recursion with linked lists

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Programming assignment** (Arrays)	Week 4 to week 7	15%	CLO1-2, CLO4
2. **Programming assignment** (Linked data structures)	Week 7 to week 12	25%	CLO1-4
3. **Lab exercises** (The best 10 out of 11 will be taken)	Throughout the semester every week	10%	CLO1-4
4. **Weekly Tests** (The best 6 out of 7 will be taken)	Week 4 to week 11	10%	CLO1-4
5. **Final Exam**	Exam period of the relevant term	40%	CLO1-4

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DPCP1092 Computer Systems Fundamentals

Course Description

This course provides a programmer's view on how a computer system executes programs, manipulates data and communicates. It enables students to become effective programmers in dealing with issues of performance, portability, and robustness.

This course aims to give students an overview of the structure and behaviour of modern computer systems and to provide a foundation for later courses on operating systems, computer architecture and compilers, where a deeper understanding of systems-level issues is required.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Describe the layers of architecture in modern computer systems from hardware device levels upwards.

CLO2: Describe the principles of memory management and explain the workings of a system with virtual memory management.

CLO3: Explain how the major components of a CPU work together, including how data (including instructions) is represented in a computer.

CLO4: Design, implement and analyse small programs at the assembly/machine level.

CLO5: Describe the relationship between high-level procedural languages (e.g., C) and assembly/machine language in the conventional machine layer, including how a compiled program is executed in a classical von Neumann machine.

CLO6: Explain how input/output operations are implemented, and describe some basic I/O devices.

CLO7: Describe the components comprising and the services offered by an operating system.

CLO8: Implement simple programs involving communication and concurrency.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (2 hrs + 2x1 hr lectures, 2x 1 hr tutorials, 2 hrs lab)	8 hours	16 hours

Topics included in the Course

Unit 1: Bit manipulation

Unit 2: Data representation

Unit 3: Instruction set architecture and MIPS assembly programming

Unit 4: Systems Calls

Unit 5: File Systems

Unit 6: Processes and Signals

Unit 7: Virtual Memory

Unit 8: Parallelism, concurrency, synchronisation, coordination, communication

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Weekly tests**	Weeks 3, 4, 5, 6, 8, 9, 10, and 11 of the term	10%	CLO1-8
2. **Assignment 1 (MIPS)**	Weeks 4 - 8	9%	CLO4
3. **Assignment 2 (C Programming)**	Weeks 8 - 12	11%	CLO2, CLO5, CLO8
4. **Labs**	Weekly throughout term	10%	CLO1-5, CLO8
5. **Final Exam** Students must get >=40% in the exam to pass, otherwise, a UF will be given for the course.	Exam Period of the relevant term	60%	CLO1-8

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DPCP1093 Software Engineering Fundamentals

Course Description

This course teaches students about software engineering principles via exposure to the important practice of building correct products in effectively functioning teams.

You will be exposed to agile software practices, team collaboration and effective communication through implementing a group project based on agile software methodologies that requires you to analyse, design, build and deploy a web-based application. This course is typically taken soon after completing DPCP1151, but could be delayed and taken later. It provides essential background for the teamwork and project management required in many later courses.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Demonstrate effective use of applying software development to build full-stack end-user applications.

CLO2: Demonstrate effective use of static testing, dynamic testing, and user testing to validate and verify software systems.

CLO3: Understand key characteristics of a functioning team in terms of understanding professional expectations, maintaining healthy relationships, and managing conflict.

CLO4: Demonstrate an ability to analyse complex software systems in terms of their data model, state model, and more.

CLO5: Understand the software engineering life cycle in the context of modern and iterative software development practices in order to elicit requirements, design systems thoughtfully, and implement software correctly.

CLO6: Demonstrate an understanding of how to use version control, continuous integration, and deployment tooling to sustainably integrate code from multiple parties.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 Hours (1 x 2hrs lectures, 2 x 1hr lectures, 1x 1 hr tutorials, 1 x hrs lab, 1 x 1hr lab)	8	16

Topics included in the Course
Unit 1: Javascript
Unit 2: Version control using git
Unit 3: Teamwork and Agile
Unit 4: Requirements, use cases, user stories and validation
Unit 5: Testing and correctness, verification, coverage
Unit 6: Package management, continuous integration, deployment
Unit 7: Designing for maintainability, conceptual modelling, software complexity
Unit 8: Full stack development, data interchange, http servers, authentication and authorisation

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
Assessment 1: Lab questions over 8 labs each worth 1.25%	Weeks 2 to 8	10%	CLO1-2, 4-6
Assessment 2: Major Project – Agile software delivery, with each milestone encompassing all the SLDC activities			
Milestone 1: Getting started with teamwork, git and prototypes	Weeks 4	7%	
Milestone 2: Basic functionality and testing	Week 7	17.5%	CLO1-6
Milestone 3: Creating a web-server, requirements addition, testing	Week 9	24.5%	
Milestone 4: Requirements change, testing and deployment	Week 12	21%	
Assessment 3: Final Exam – short answer questions and programming exercises	Exam Period of relevant term	20%	CLO1-2, 4-6

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DPPH1021 Physics 1A

Course Description

This course builds on elementary knowledge of physics (Year 12 physics or equivalent). It introduces mechanics, thermal physics, waves, and the techniques of analysis and problem-solving in the physical world. Students will develop their ability to use mathematics and fundamental physical concepts to solve problems related to the world around them. It is a calculus-based course where concepts and principles are learned in context, by example, and then developed through practice solving problems. Throughout the course, the skills of problem-solving are refined by learning when and how to apply different principles of physics, mathematics and other relevant tools. Students are encouraged to develop their communication skills through active participation in tutorials and laboratory exercises. This course is examined at two levels, with DPPH1021 being the lower and DPPH1023 being the higher of the two levels.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Analyse motion in two dimensions using vectors. Apply Newton's laws of motion to objects undergoing uniform translational or rotational acceleration.

CLO2: Analyse problems involving friction and the forces and deformations described by Hooke's law.

CLO3: Explain the difference between kinetic and potential energy and use the law of conservation of energy and the work-energy theorem to solve mechanics problems.

CLO4: Apply the conservation laws of momentum and energy to solve mechanics problems, including problems involving collisions, extended objects and their centers of mass.

CLO5: Apply the law of universal gravitation in combination with other laws covered in this course to describe, predict and explain the motion of satellites, planets, stars and galaxies.

CLO6: Explain how energy conservation is related to the first law of thermodynamics. Apply the first law to solve problems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO7: Recognise and solve problems relating to different thermodynamic processes, including adiabatic, isothermal, isobaric and isovolumetric processes. For cyclic processes, calculate changes in internal energy, work done and heat transferred in cycles.

CLO8: Describe different heat transfer mechanisms and calculate the amount of heat transferred in different processes.

CLO9: Identify physical systems that can be understood using models of simple harmonic oscillation and write down equations to describe this motion.

CLO10: Write down and solve equations describing wave motion, and use these equations to explain physical phenomena such as (but not limited to) standing waves and interference.

CLO11: Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (3 x 1hr lectures, 2 x 1 hr tutorials, 1 hr workshop, 2 hrs Lab (8 labs total))	8 hours	16 hours

Topics included in the Course

Mechanics

1 Motion along a straight

2 Vectors

3 Motion in two and three dimensions

4 Force and motion

5 Work and energy

6 Centre of mass and linear

7 Rotation and torque

8 Gravitation

Thermal Physics

1	Temperature
2	Kinetic theory of gases
3	Heat and the first law of

Waves

1	Oscillations
2	Wave motion
3	Sound waves

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. Term Test 1 Covers all of the Mechanics.	Week 8	10%	CLO1-11
2. Term Test 2 Covers all of Thermal Physics and Oscillations.	Week 13	10%	CLO1-11
3. Online Quizzes 6 quizzes each with an unlimited number of attempts, and the best score counts.	Starting week 2; approximately every 2 weeks	10%	CLO1-11
4. Laboratory Work 8 laboratory exercises.	Starting week 3; approximately every week.	20%	CLO11
5. Final Exam	Exam period of the relevant term	50%	CLO1-11

DPPH1023 Higher Physics 1A

Course Description

This course builds on elementary knowledge of physics (Year 12 physics or equivalent). It gives an introduction to mechanics, thermal physics, waves, and the techniques of analysis and problem-solving in the physical world. Students will develop their ability to use mathematics and fundamental physical concepts to solve problems related to the world around them. It is a calculus-based course where concepts and principles are learned in context, by example, and then developed through practice solving problems. Throughout the course, the skills of problem-solving are refined by learning when and how to apply different principles of physics, mathematics and other relevant tools. Students are encouraged to develop their communication skills through active participation in tutorials and laboratory exercises. This course is examined at two levels, with DPPH1021 being the lower and DPPH1023 being the higher of the two levels.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Analyse motion in two dimensions using vectors. Apply Newton's laws of motion to objects undergoing uniform translational or rotational acceleration.

CLO2: Analyse problems involving friction and the forces and deformations described by Hooke's law.

CLO3: Explain the difference between kinetic and potential energy and use the law of conservation of energy and the work-energy theorem to solve mechanics problems.

CLO4: Apply the conservation laws of momentum and energy to solve mechanics problems, including problems involving collisions, extended objects and their centers of mass.

CLO5: Apply the law of universal gravitation in combination with other laws covered in this course to describe, predict and explain the motion of satellites, planets, stars and galaxies.

CLO6: Explain how energy conservation is related to the first law of thermodynamics. Apply the first law to solve problems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO7: Recognise and solve problems relating to different thermodynamic processes, including adiabatic, isothermal, isobaric and isovolumetric processes. For cyclic processes, calculate changes in internal energy, work done and heat transferred in cycles.

CLO8: Describe different heat transfer mechanisms and calculate the amount of heat transferred in different processes.

CLO9: Identify physical systems that can be understood using models of simple harmonic oscillation and write down equations to describe this motion.

CLO10: Write down and solve equations describing wave motion, and use these equations to explain physical phenomena such as (but not limited to) standing waves and interference.

CLO11: Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (3 x 1hr lectures, 2 x 1 hr tutorials, 1 hr workshop, 2 hrs Lab (8 labs total))	8 hours	16 hours

Topics included in the Course

Mechanics

1 Motion along a straight

2 Vectors

3 Motion in two and three dimensions

4 Force and motion

5 Work and energy

6 Centre of mass and linear

7 Rotation and torque

8 Gravitation

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Thermal Physics

1. Temperature
2. Kinetic theory of gases
3. Heat and the first law of

Waves

1. Oscillations
2. Wave motion
3. Sound waves

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Term Test 1** Covers all of Mechanics.	Week 8	10%	CLO1-11
2. **Term Test 2** Covers all of Thermal Physics and Oscillations.	Week 13	10%	CLO1-11
3. **Online Quizzes** 6 quizzes each with an unlimited number of attempts, and the best score counts.	Starting week 2; approximately every 2 weeks	10%	CLO1-11
4. **Laboratory Practical's** 8 laboratory exercises.	Starting week 3; approximately every week.	20%	CLO11
5. **Final Exam**	Exam period of the relevant term	50%	CLO1-11

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DPEG1071 Introduction to Engineering Design and Innovation

Course Description

In this course, students will experience one of the major things that engineers do: designing and building creative solutions to problems. They will learn to think the way that engineers think, coming up with good solutions to problems despite being limited by budget, time and resources, the requirement to also meet environmental and social objectives and of course the limitations of the laws of physics. This will help them to appreciate the central ideas of engineering design as an on-time, on-budget and fit-for-purpose solution to a poorly specified, open-ended problem. They will be assigned to a team to work over twelve weeks to solve a practical problem. The projects on offer change from year to year. In doing all this they will start to build key skills for engineers that will be called upon repeatedly in their academic and professional lives, including concept development, critical thinking and evaluation skills, clear communication, research and information literacy skills and the skills involved in successfully functioning within a team environment to complete a given task.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Demonstrate an understanding of the process of engineering design and the use of design methods for defining an open-ended design problem; generating alternative and innovative conceptual solutions; and evaluating these solutions.

CLO2: Understand the dynamics of collaborative teams and how to work effectively within a team to accomplish tasks within given deadlines.

CLO3: Understand the basic elements of project management and be able to plan and schedule work activities following standard practice.

CLO4: Be able to convey your thoughts and ideas effectively in an engineering design report.

CLO5: Become familiar with the tangible elements of design within a specific engineering discipline: demonstrate the effective use of the tools, equipment, and materials of the specific discipline; and recognize some basic engineering materials, devices and mechanisms which form the "building blocks" of much of the world's machinery, circuitry, and engineering systems in general.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
7 hours (2 x 2hrs lectures, 1x 1hr tutorials, 1 x 2hrs Lab)	7 hours	14 hours

Topics included in the Course

The Engineering Design Process

1. Problem Statement
2. Pairwise Comparison Chart
3. Conceptual Design
4. Brainstorming Methods
5. Morph Chart
6. Concept Evaluation Methods

Project Management

1. Project Management
2. Risk Management
3. Technical drawings
4. Oral Presentations

Design Reports

1. Nodal Analysis
2. Super-node Concept
3. Mesh Analysis
4. Super-mesh Concept

Technical lectures

1. Introduction to Electronics
2. Diodes
3. Transistors
4. DC Motors, Electric Drive Circuits and Op Amps
5. Arduino Introduction
6. Sensors and Filtering Circuits

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Impromptu Design Writing Task** (Individual assessment, 400 words, 40 mins)	Week 1 of the term	5%	CLO1-5
2. **Problem Statement Presentation** (Individual assessment, 2 mins, 50:50 evaluated by Tutor and Peers)	Week 3 of the term	5%	CLO1-3
3. **Concept Generation Presentation** (Group assessment, 15 mins, 50:50 evaluated by Tutor and Peers)	Week 5 of the term	5%	CLO1-3
4. **Concept Generation Writing Task** (Individual assessment, 1 page)	Week 6 of the term	5%	CLO3-4
5. **Design Journal** (Individual assessment, Via OneNote)	Week 6 and 11 of the term	10%	CLO3-4
6. **Design Proposal** (Group assessment, 10 pages)	Week 8 of the term	10%	CLO1-4
7. **Compliance Testing** (Group assessment, Initial Performance check of design prototypes)	Week 9 of the term	10%	CLO1-5
8. **Final Testing** (Group assessment, Final Performance check of design prototypes)	Week 12 of the term	20%	CLO1-5
9. **Final Design Report** (Group 9% & Individual 21%)	Week 12 of the term	30%	CLO1-4
10. **Team Evaluation** (Used to moderate students' final marks and pick up non-cooperative team members)	Week 7 and 12 of the term	± 25%	CLO2

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DPBA1051 Molecules, Cells and Genes

Course Description

This course aims to introduce students to the basic concepts of modern biology, with particular emphasis on cell structure, function and genetics. The chemistry of life is examined, with emphasis on how living things construct and break down macromolecules. How the genetic code controls these processes depends to a great extent on the structure and function of cell components, and cell biology is a major component of the course. The final topic is genetics - how the genetic code is inherited and how it can be modified. In the process of understanding these concepts, the student will also develop skills in scientific thinking and critical analysis.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Effectively communicate scientific findings to different audiences using different methods.

CLO2: Identify different types of cells, their structures and functions, and compare and contrast them.

CLO3: Outline the processes for energy generation in cells, including the structure and roles of proteins, carbohydrates and lipids.

CLO4: Describe the structures of genetic material, the processes involved in cell division and gene expression, and how these relate to inheritance.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
7 Hours (3 x 1hr lectures, 2 x 1hr tutorials, 3hrs lab for 7 weeks of term)	7 hours	14 hours

Topics included in the Course

Thinking like a scientist

1 Scientific literature

2 Science communication

3 Experimental design

Cell biology and architecture

1 Properties of water and life

2 Prokaryotic and eukaryotic cells

3 Cell structure and function

4 Cell integrity and the plasma membrane

Nutrient and ion transport

Metabolism

1 Macromolecules: Carbohydrates, lipids, proteins and nucleic acids

2 Metabolic concepts: Catabolism, anabolism, enzymes, redox reactions

3 Cellular respiration and fermentation: Extracting energy from food

Photosynthesis: Synthesising food from energy

Genetics

1 DNA replication

2 Cell division and reproduction

3 Polymerase Chain Reaction

4 Gene expression: transcription, translation and regulation

5 Mutation

6 Mendel's laws of heredity

7 Mechanisms of inheritance

8 Population genetics

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. Online quizzes Five quizzes comprising multiple choice, drag and drop and fill-in-the-blanks style questions. Topics include prokaryotic and eukaryotic cell structure; osmosis and diffusion; photosynthesis; mitosis and meiosis; DNA replication).	Weeks 2, 4, 6, 8, and 10 of the term.	5%	CLO2-4
2. Science communication project Group project on an advanced biology topic chosen by the students. Consists of 4 components: **Literature review** Individual task; review of literature on group topic; 2000 words limit; 15%. **Group proposal** Group-written submission of ideas on the design, biological content and feasibility of group presentation; max. two A4 pages; 5%. **Group presentation** 6-10 min group presentation on the chosen topic; format optional e.g., video, PowerPoint, web page etc; 15%. **Group portfolio** Group submission; Written record of group meetings; 5%.	Weeks 7, 9 and 12 of the term.	40%	CLO1-4

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Assessment Tasks

3. **Mid-term exam** 40 multiple choice questions; 50 min duration; covers content from weeks 1-5 of the term.	Week 6 of the term	15%	CLO1-3	
4. **Final Exam** 30 x 1-mark multiple choice questions + 14 x 5-mark short answer questions; 2.5 hrs duration. Covers all course content.	Exam Period of relevant term	40%	CLO1-4	

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DPBA1052 Applied Biomolecular Sciences

Course Description

This course provides an overview of the application of molecular and cellular biology to the fields of medicine, plant and animal science, and food, marine and environmental sciences. It draws comparisons between contemporary and conventional technologies through the introduction of traditional and recombinant genetics, microbiology, biochemistry and fermentation engineering in the context of their contribution to the industrial application of biological systems.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Understand the fundamental principles of the industrial implementation of bioprocesses, including the professional and ethical issues associated with the commercial development of biotechnological processes.

CLO2: Pose questions, design experiments and interpret the resultant experimental data with respect to the literature.

CLO3: Identify inconsistencies in scientific thought and writing through a thorough understanding of the relevant literature and the correct use of references to support arguments and hypotheses.

CLO4: Appreciate the interdisciplinary and rapidly changing nature of biotechnology and the importance of teamwork in both scientific discovery and the development of biotechnological processes.

CLO5: Communicate scientific ideas and discoveries in biotechnology, to the industrial, scientific and general communities, using the written and spoken word as well as electronic media.

CLO6: For the practical component, exemplify the industrial nature of biotechnology in support of the

lecture component. In part, this will be accomplished by developing good laboratory skills, such as the ability to work safely and effectively in a laboratory, to utilise relevant equipment, and to make use of protocols, manuals and safe operating procedures.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
6 hours (2 x 1hr lectures, 2 x 1 hr tutorials, 3hrs lab for 8 weeks of term)	6 hours	12 hours

Topics included in the Course

Cell structure, biochemistry and metabolism

1 Eukaryotic cell structure and function

2 Bacterial cell structure

3 Microbial energetics

Microbial growth and bioenergetics

1 Microbial growth

2 Bioprocesses: growing cells on industrial scales

3 Microbial diversity and novel methods of cell culture

4 Metabolism and Enzymes

5 Microbial nutrient cycling and global impact

Genetics and genetic engineering

1 Understanding DNA, RNA, and proteins from a biological perspective

2 Conventional genetics and mutation

3 Recombinant DNA technology and the principles of cloning

4 Genomics and bioinformatics

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Frontiers in biotechnological research and industrial applications

1 Biofuels

2 Clinical genomics

3 Medical mycology and biotechnology

4 Bioremediation

5 Brewing and fermented beverages

6 Industrial enzymes

7 Astrobiology

8 The commercialisation of scientific discoveries

9 Vaccines

Laboratory skills

1 Microbiological techniques: culturing, phenotyping and quantification

2 Spectrophotometry and serial dilutions

3 Experimental design

4 PCR and gel electrophoresis

5 Genetic modification techniques

6 Lab safety

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Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Lab quizzes** Eight short multiple-choice quizzes based on weekly lab topics.	Weeks 3-6, 8-11 of the term	4%	CLO1-2, CLO4, CLO6
2. **Lab discussions** Student contribution to eight 15 min group discussions on weekly lab topics.	Weeks 3-6, 8-11 of the term	8%	CLO1-6
3. **Literature review** 2000-3000 words review of scientific literature. Topic: Discovery and application of industrial enzymes for use in the production of biofuels	Week 8 of the term	15%	CLO1-5
4. **Experimental design report** Group written report. Topic: design an experimental protocol to produce biofuel from amylase extracted from a thermophilic bacterial species; approx. 6 A4 pages.	Week 12 of the term	8%	CLO1-6
5. **Mid-term exam** 40 multiple choice questions; 50 min duration; covers content from weeks 1-5 of the term.	Week 6 of the term	20%	CLO1-4, CLO6
6. **Final Exam** 100 multiple choice questions; 2.5 hours duration. Covers all course content.	Exam period of the relevant term	45%	CLO1-6

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DPPH1022 Physics 1B

Course Description

This course builds on the physics learnt in Physics/Higher Physics 1A to further develop an understanding of the mathematical description of the laws of nature. It gives an introduction to electromagnetism, physical optics, quantum physics, and the techniques of analysis and problem-solving in the physical world. Students will develop their ability to use mathematics and fundamental physical concepts to solve problems related to the world around them. It is a calculus-based course where concepts and principles are learned in context, by example, and then developed through practice solving problems. Throughout the course, the skills of problem-solving are refined by learning when and how to apply different principles of physics, mathematics and other relevant tools. Students are encouraged to develop their communication skills through active participation in tutorials and laboratory exercises. This course is examined at two levels, with DPPH1022 being the lower and DPPH1024 being the higher of the two levels.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Use Coulomb's law and Gauss's law to calculate electric fields for configurations of charges, use these electric fields to calculate electric potentials. Compare and contrast electric fields to gravitational fields covered in Physics/Higher Physics 1A.

CLO2: Be able to state the definition of capacitance and use this definition with equations for electric field and voltages to calculate the capacitance of different geometries.

CLO3: Calculate the electrostatic and magnetic fields produced by moving charges in a variety of configurations using the Laws of Biot-Savart and Ampère. Relate electric and magnetic fields using Faraday's law; use this to calculate induced currents and voltages.

CLO4: Use equations to describe and explain the properties of electromagnetic waves (such as wavelength, frequency, intensity, power and radiation pressure) and relate these to electric and magnetic fields and the speed of light.

CLO5: Use equations and diagrams to solve advanced problems about electromagnetic waves related to polarisation, interference and diffraction.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO6: Discuss and explain (qualitatively and quantitatively) the key observations and events that led to the development of quantum mechanics.

CLO7: Relate emission and absorption spectra to the energy change of electrons between states in an atom, calculate the energy levels of electrons in Hydrogen-like atoms, and relate this to quantum mechanical laws.

CLO8: Describe and explain the physics relating to modern devices and technologies including semiconductors, transistors, LEDs and solar cells.

CLO9: Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (3 x 1hr lectures, 2 x 1 hr tutorials, 1 hr workshop, 2 hrs Lab (8 labs total))	8 hours	16 hours

Topics included in the Course

Electricity and Magnetism

1. Coulomb's law
2. Electric fields
3. Gauss's law
4. Electric potential
5. Capacitance
6. Magnetic fields
7. Magnetic fields due to currents
8. Induction and inductance

Physical Optics

1. Electromagnetic waves
2. Interference
3. Diffractions

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Introductory Quantum Physics and Solid State Physics

1   Photons and matter waves

2   Conduction and electricity in solids

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Term Test 1** Covers all of Electricity and Magnetism.	Week 13	10%	CLO1-9
2. **Term Test 2** Covers all of Physical Optics Introductory Quantum Physics and Solid State Physics.	Starting week 2; approximately every 2 weeks	10%	CLO1-9
3. **Online Quizzes** 6 quizzes each with an unlimited number of attempts, and the best score counts.	Starting week 3; approximately every week.	20%	CLO9
4. **Laboratory Practical's** 8 laboratory exercises.	Exam period of the relevant term	50%	CLO1-9
5. **Final Exam**	Week 13	10%	CLO1-9

DPPH1024 Higher Physics 1B

Course Description

This course builds on the physics learnt in Physics/Higher Physics 1A to further develop an understanding of the mathematical description of the laws of nature. It gives an introduction to electromagnetism, physical optics, quantum physics, and the techniques of analysis and problem-solving in the physical world. Students will develop their ability to use mathematics and fundamental physical concepts to solve problems related to the world around them. It is a calculus-based course where concepts and principles are learned in context, by example, and then developed through practice solving problems. Throughout the course, the skills of problem-solving are refined by learning when and how to apply different principles of physics, mathematics and other relevant tools. Students are encouraged to develop their communication skills through active participation in tutorials and laboratory exercises. This course is examined at two levels, with DPPH1022 being the lower and DPPH1024 being the higher of the two levels.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Use Coulomb's law and Gauss's law to calculate electric fields for configurations of charges, use these electric fields to calculate electric potentials. Compare and contrast electric fields to gravitational fields covered in Physics/Higher Physics 1A.

CLO2: Be able to state the definition of capacitance and use this definition with equations for electric field and voltages to calculate the capacitance of different geometries.

CLO3: Calculate the electrostatic and magnetic fields produced by moving charges in a variety of configurations using the Laws of Biot-Savart and Ampère. Relate electric and magnetic fields using Faraday's law; use this to calculate induced currents and voltages.

CLO4: Use equations to describe and explain the properties of electromagnetic waves (such as wavelength, frequency, intensity, power and radiation pressure) and relate these to electric and magnetic fields and the speed of light.

CLO5: Use equations and diagrams to solve advanced problems about electromagnetic waves related to polarisation, interference and diffraction.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO6: Discuss and explain (qualitatively and quantitatively) the key observations and events that led to the development of quantum mechanics.

CLO7: Relate emission and absorption spectra to the energy change of electrons between states in an atom, calculate the energy levels of electrons in Hydrogen-like atoms, and relate this to quantum mechanical laws.

CLO8: Describe and explain the physics relating to modern devices and technologies including semiconductors, transistors, LEDs and solar cells.

CLO9: Recognise that physics is an experimental science, plan and conduct experiments and analyse the outcomes, and include reliable estimates of uncertainties in measurements.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
8 hours (3 x 1hr lectures, 2 x 1 hr tutorials, 1 hr workshop, 2 hrs Lab (8 labs total))	8 hours	16 hours

Topics included in the Course

Electricity and Magnetism

1   Coulomb's law
2   Electric fields
3   Gauss's law
4   Electric potential
5   Capacitance
6   Magnetic fields
7   Magnetic fields due to currents
8   Induction and inductance

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Physical Optics

1. Electromagnetic waves
2. Interference
3. Diffractions

Introductory Quantum Physics and Solid State Physics

1. Photons and matter waves
2. Conduction and electricity in solids

Assessment Tasks

Type	When assessed	Weighting	Cross-reference to learning outcomes
1. **Term Test 1** Covers all of Electricity and Magnetism.	Week 8	10%	CLO1-9
2. **Term Test 2** Covers all of Physical Optics Introductory Quantum Physics and Solid State Physics.	Week 13	10%	CLO1-9
3. **Online Quizzes** 6 quizzes each with an unlimited number of attempts, and the best score counts.	Starting week 2; approximately every 2 weeks	10%	CLO1-9
4. **Laboratory Practical's** 8 laboratory exercises.	Starting week 3; approximately every week.	20%	CLO9
5. **Final Exam**	Exam period of the relevant term	50%	CLO1-9

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DPCA1001-3 Communication and Academic Literacy (Cal) 1, 2 & 3

Course Description

This course is designed to equip learners with the academic literacy and communication skills they require to succeed in their tertiary studies. This course is characterised by a focus on tertiary orientation, academic literacy, critical thinking, and learner autonomy. The study of advanced functional language forms which promote textual coherence and cohesion at a tertiary level are embedded. The aim of this course is to assist the process of acculturation and promote broader engagement in campus life. It also aims to foster a deeper understanding of how word choice, sentence structure, and the organisation of ideas can affect clarity of expression and facilitate greater communicative and academic competence. Students learn to recognise and create texts based on logical organisational patterns and identify expressions commonly used in academic discourse to signal relationships between ideas. There is a strong emphasis on reflection and the learning process. Learners are encouraged to work collaboratively and to develop effective self-directed study skills. Course materials are based on topics and issues which reflect the variety of disciplines students will go on to pursue as part of their future courses of study. Authentic tertiary input and resources are used where appropriate to ensure that learning activities are relevant and meaningful. The themes selected as the context for the learning activities reflect broad topics which may be studied from a variety of disciplinary perspectives. The focus includes macro-language skills, discourse management and academic literacy skills. CAL encourages collaborative and independent work with both peers and teachers to better prepare students for the Australian university context. Learners are engaged in practical task-oriented activities and assessment tasks. They are encouraged to analyse ideas, evaluate claims, and search for answers to self-generated questions. A range of academic spoken and written text types are addressed throughout the course. Some of these texts include: academic readings, case studies, reports, critical reviews, reflections, summaries, annotated bibliographies, short-answer responses, tutorial discussions, presentations, simulations etc. The course, is organised in a series of skills-based modules and is delivered in a fully online or fully face-to-face mode, using blended learning approaches. The spread of hours across the CAL course is 48 to 144 hours dependent of English language proficiency. Student requiring greater English language support may take the course over three terms.

Course Learning Outcomes
On successful completion of this course students will be able to:

CLO1: Use & produce language required to operate successfully at an Australian university.

CLO2: Select, analyse and evaluate information, ideas, & academic sources.

CLO3: Clearly express ideas, organise information, & incorporate evidence.

CLO4: Produce written texts demonstrating recognised academic conventions.

CLO5: Engage in group discussions & deliver oral presentations.

CLO6: Communicate with peers & university staff in both academic & social domains.

CLO7: Demonstrate a reflective & self-directed approach to learning.

No. timetabled hours per week	No. personal study hours per week	Total workload hours per week
4-8 hours per week (Term 1)	Approx. 2 – 4 hours per week	6 – 12 hours per week
2 hours per week (Term 1, 2 or 3)	Approx. 1 – 2 hours per week	3 – 6 hours per week
2 hours per week (Term 1, 2, or 3)	Approx. 1 hours per week	3 – 6 hours per week

Topics included in the Course

Unit 1: Developing an academic style: Communicating at university + Being a critical reader.

Unit 2: Critical analysis and expressing ideas clearly: Writing for university + Presenting and supporting claims.

Unit 3: Incorporating different perspectives: Referring to academic sources + Synthesising information from multiple sources.

Unit 4: Negotiating and problem solving: Developing credible arguments.

Unit 5: Negotiating and problem solving: Analysing problems and evaluating responses.

Unit 6: Joining a discourse community: Investigating your field of study.

Unit 7: Joining a discourse community: Reporting on research findings.

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Assessment Tasks

Type	Cross-reference to learning outcome	48 Hours		144 Hours – Students who require extra English language support	
		When assessed	Weighting (% of total marks for unit)	When assessed	Weighting (% of total marks for unit)
Reflection Activities: Reflective video, writing and interview	CLO1-3, 5-7	Week 3, 12, Term 1	20%	Week 3, Term 1 Week 12, Term 2 Week 12, Term 3	10%
Quizzes Quiz 1: Listening Skills Quiz 2: Reading & Writing Quiz 3: Academic Language Quiz 4: Academic Language	CLO1, 3, 6-7	Week 3-12, Term 1	20%	Week 4, Term 1 Week 6, Term 1 Week 7, Term 1 Week 3, Term 2	10%
Seminars Part 1. Critical Reading Seminar Part 2. Group Seminar Presentation	CLO1-7	N/A	0%	Week 8, Term 1 Week 12, Term 1	20%
Case Study Students identify the core issues and pose justifiable solutions to the problem	CLO1-4, 6-7	Week 2, Term 1	20%	Week 6, Term 2	10%
Emergency Summit Students assume the role of a real-world stakeholder in an 'Emergency Summit' and prepare a well-reasoned response to a given 'wicked problem'.	CLO1-7	Week 6, Term 1	20%	Week 11, Term 2	10%

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Assessment Tasks

Individual Poster Presentation/Report	CLO1, 7	Week 3, Term 1	20%	Week 6, Term 3 Week 11, Term 3	20%
Integrated Skills Test Reading, Listening & Writing	CLO1-4	N/A	0%	Exam Week, Term 3	20%