Unit Guide

Diploma of Science – Education Specialisation

Monash College

MONASH College

Unit Guide — Diploma of Science – Education Specialisation

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Overview

The Diploma of Science, Education specialisation, offers specialist preparation for direct entry into the second year of the Monash University double degree in Education and Science.

As well as providing foundational knowledge and experience in education, core subjects introduce students to the fundamentals of the scientific method in both theory and practice, and units are available across a range of science and related disciplines including Chemistry, Physics, Biology, Mathematics, Psychology, Computing and Engineering.

There are two entry points into the Diploma of Science - Part One and Part Two - with the entry point for each applicant determined by their academic background and English language level.

Diploma of Science Course Outcomes

On completion of the Diploma of Science, students should be able to demonstrate the following skills and knowledge and their application:

1. Knowledge of technical and theoretical issues in a variety of science disciplines, underpinned by scientific and mathematical theory.

2. Identify and communicate advice in a variety of science disciplines to address technical problems in accord with management requirements

3. Utilise technical skills to demonstrate understanding and problem solving in relation to science issues involving diverse stakeholders

4. With depth in some areas, critically apply theoretical and technical skills to solve problems in relation to a range of science disciplines

5. Manage work priorities and coordinate the work of others in accord with parameters set by management in a number of science contexts.

Monash College Diplomas Graduate Attributes

All Monash College courses will develop the following graduate attributes:

- Communication - demonstrated by effective communication in a variety of contexts

- Collaboration - demonstrated by working positively with others to achieve common goals

- Social and Cultural Engagement - demonstrated by respect for diversity and recognition of ethical responsibilities, including towards knowledge creation and academic integrity

- Critical Thinking and Problem Solving - demonstrated by the ability to analyse, evaluate and synthesise information to solve problems and innovate

- Independent Learning - demonstrated by the initiative, reflective practice and resilience necessary for self-directed learning, and possession of the foundational discipline knowledge and skills appropriate to commence their destination studies

- Academic Skills - demonstrated by understanding and appropriate application of scholarly practices and standards.

Note on delivery mode

For the duration of disruptions caused by the COVID-19 pandemic, units in this Diploma may be undertaken online, face-to-face or via a hybrid blend of both. Subject to government health restrictions, students who are able to attend scheduled face-to-face classes are expected to do so. Delivery will also support and accommodate students who are unable to attend classes in person.

DIPLOMA PART I			
Unit Code	**Unit Name**	**Unit EFTSL[1]**	**Credit Point[2]**
MCD1160	Introductory Engineering Computing	0.125	6
MCD1170	Introductory Chemistry	0.125	6
MCD1180	Introductory Physics	0.125	6
MCD1700	Introductory Mathematics	0.125	6
MCD1190	Chemistry A	0.125	6
MCD1200	Physics A	0.125	6
MCD1710	Introductory Biology	0.125	6
MCD1750	Intermediate Mathematics	0.125	6

DIPLOMA PART 2			
Unit Code	**Unit Name**	**Unit EFTSL[1]**	**Credit Point[2]**
MCD2080	Business Statistics	0.125	6
MCD4410	Blueprints for Life	0.125	6
MCD4390	Chemistry 1	0.125	6
MCD8010	Working in Education: An Introduction to the Profession	0.125	6
MCD8030'/50	Primary/Secondary Professional Experience Placement 1A	-	
MCD4400	Chemistry 2	0.125	6
MCD4420	Life on Earth	0.125	6
MCD8020	Approaches to Teaching and Learning	0.125	6
MCD8050/60	Primary/Secondary Professional Experience Placement 1B	-	
1 Elective from:			
● MCD2130 Functions and Their Applications		0.125	6
● MCD4500 Engineering Mathematics		0.125	6
● MCD4160 Physics for Engineering		0.125	6
● MCD6080 Psychology 1A		0.125	6

1. EFTSL: Effective Full-time Student Load. Each part of the Diploma is equivalent to one year of full-time study. Monash College Diplomas are delivered in an accelerated mode, so you can study more than a standard full-time load in a year.

2. Most Monash units are 6 credit points. To complete a full Monash College Diploma, you must pass 96 credit points; if you start in Part 2 you must pass 48 credit points. To complete the Education specialisation you will also need to complete the two non-credit Professional Experience units. Credit points in Part 2 units count towards the first year of your Monash University degree.

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MCD1160 – Introductory Engineering Computing

Description

Today's engineers rely heavily on the use of computers. To solve problems of practical significance, you need to apply scientific and technical knowledge, common sense, and experience. This unit will provide you with an understanding of basic computer software and programming concepts, and how it is used within the engineering environment. You will learn how to effectively communicate technical information using modern document editing, spreadsheet and presentation applications, and execute professional oral presentations to share your findings. Further, you will develop skills to solve real-world problems using microcontrollers and programming language.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Use the formatting features of a word processor.
2. Use utilities and advanced features provided with a word processor.
3. Create and format a spreadsheet.
4. Use functions and formulas to perform calculations in a spreadsheet.
5. Use graphics in a spreadsheet.
6. Use advanced facilities of a spreadsheet.
7. Designing professional presentation slides, incorporating text, graphics and sound, and presentation of information, including the use of bullet points
8. Designing slideshows, animation of a slide, slide transitions, use of templates & the auto content wizard.
9. Communicate technical content in effective oral presentations.
10. Implement problem-solving strategies.
11. Decompose problems into simpler problems.
12. Construct and test simple computer programs.
13. Analyse and debug existing programs.
14. Recognise the importance of good practices in programming.
15. Understand how real-world problems can be addressed in the digital age.

Assessments

- Test 1 - 10%
- Test 2 - 10%
- Assignment 1 - 25%
- Assignment 2 - 35%
- Lab Participation - 10%
- Weekly Quizzes - 10%

Students must achieve an overall mark of 50% or higher in order to pass this unit.

MCD1170 – Introductory Chemistry

Description

Chemistry is the science of matter and the transformations it can undergo. It plays a central role in medicine, engineering and many sciences. It helps us understand our surroundings and the way we function. Students will investigate the various analytical techniques that are used to analyse substances depending on their properties. The knowledge and skills gained in this unit will be further extended in MCD1190 Chemistry A.

Prerequisites

Students should have completed an equivalent to Victorian VCE Year 11 Chemistry, Units 1 & 2

Learning Outcomes

On completion of this unit, students should be able to:

1. Express chemical reactions symbolically, qualitatively and quantitatively.

2. Explain the concepts of bonding between atoms and relate this to the properties of compounds.

3. Explain the factors affecting the rate of a reaction and perform calculations for thermochemical equations

4. Calculate equilibrium constants and explain how the position of equilibrium can be altered, including examples from industry.

5. Explain acids and bases and perform calculations related to pH

6. Explain the structure and naming of simple organic molecules.

7. Explain the gas laws and apply calculations related to these

8. Demonstrate proficiency in communicating scientific results through a range of formats (written and oral);

9. Develop practical, report writing and scientific inquiry skills by the investigation of chemical experiments in the laboratory.

Assessments

- Test 1 - 7%
- Test 2 - 8%
- Quizzes - 10%
- Poster / Presentation - 10%
- Laboratory work - 15%
- Final examination - 50%

Students must achieve an overall mark of 50% or higher with a minimum mark of 40% in the final examination in order to pass this unit.

MCD1180 – Introductory Physics

Description

Through the study of physics, we are able to gain a greater understanding of the nature of the universe. Physics strives to reveal nature's underlying simplicity and establish the rules which cause galaxies to form, the toast to burn, or what holds the component parts of a proton together. Physics underlies all of the life and physical sciences, as well as engineering and technology. You will be engaged in practical work to allow you to explore and measure key theories.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Describe the difference between qualitative and quantitative techniques; record accurate observations.

2. Select measuring equipment of appropriate accuracy.

3. Utilise appropriate numbers of significant figures.

4. Recognise the measurement error in selected equipment; identify sources of error in analytical procedures.

5. Distinguish between displacement, speed, velocity and acceleration.

6. Distinguish between scalar and vector quantities.

7. Apply the laws of motion to practical situations.

8. Demonstrate knowledge of mass, force and their relationship through Newton's laws.

9. Differentiate between work, energy, kinetic energy, potential energy and power.

10. Differentiate between force and torque and apply the laws of equilibrium to practical situations.

11. Distinguish between displacement, amplitude, period, frequency and wavelength of a wave.

12. Describe behavior of waves in terms of reflection, refraction, diffraction and interference.

13. Distinguish between energy, intensity and intensity level in a wave.

Assessments

- Test 1 - 5%
- Quizzes - 10%
- Test 2 - 10%
- Laboratory - 20%
- Projects - 15%
- Final Exam - 40%

Students must achieve an overall mark of 50% or higher with a minimum mark of 40% in the final examination in order to pass this unit. Overall mark consists of internal assessments and final examination marks.

MCD1190 - Chemistry A

Description

Chemistry is an important branch of science which has a direct impact upon our lives. For example, knowledge of chemical concepts will assist us to explore new and cheaper energy sources, improve health and safety standards, and develop 'greener' and environmentally friendly processes, which reduce pollution and wastage in the environment. You will investigate, explore and discuss chemical concepts and issues, and solve quantitative and qualitative problems in class.

Prerequisites

MCD1170 Introductory Chemistry or VCE Year 11 Chemistry, Unit 2.

Learning Outcomes

On completion of this unit, students should be able to:

1. Demonstrate the importance of energy transformations in thermochemical and electrochemical reactions.

2. Discuss factors which give rise to chemical kinetics; differential and integrated rate laws.

3. Explain the structure and naming of simple organic molecules.

4. Distinguish between the different chromatographic types and various spectroscopic techniques in order to understand their use in qualitative and quantitative chemical analysis.

5. Relate organic chemical structures to observed chemical reactions, using examples from those involved in human nutrition and global cycling of nutrients.

6. Demonstrate proficiency in communicating scientific results through a range of formats (written and oral);

7. Develop practical, report writing and scientific inquiry skills by the investigation of chemical experiments in the laboratory.

Assessments

- Test 1 - 7%
- Test 2 - 8%
- Quizzes - 10%
- Poster Presentation - 10%
- Laboratory - 15%
- Final Examination - 50%

Students must achieve an overall mark of 50% or higher with a minimum mark of 40% in the final examination in order to pass this unit. Overall mark consists of internal assessments and final examination marks.

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MCD1200 - Physics A

Description

This unit continues on from MCD1180 Introductory Physics, and considers the basic concepts of practical investigation, rotational motion, electricity, magnetism and atomic theories. Through practical work, you will relate your theoretical knowledge to experimental processes and engage in critical observation and testing of physical phenomena.

Prerequisites

MCD1180 Introductory Physics

Learning Outcomes

On completion of this unit, students should be able to:

1. Demonstrate knowledge of the value of practical work.

2. Apply the theory of rotational motion.

3. Solve problems involving electricity and magnetism.

4. Analysis and evaluate the construction materials, and evaluate the effect of forces and loads on structures and materials

5. Explain a range of atomic theories.

Assessments

- Test 1 - 5%
- Quizzes - 10%
- Test 2 - 10%
- Laboratory work - 20%
- Project - 15%
- Final Exam - 40%

Students must achieve an overall mark of 50% or higher with a minimum mark of 45% in the final examination in order to pass this unit. Overall mark consists of internal assessments and final examination marks.

MCD1700 – Introductory Mathematics

Description

The unit will provide students with the pre-requisite knowledge and skills to progress to the higher levels of mathematics in the STEM diplomas and subsequently in the relevant degree programs.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1.   Identify number sets in complex domain.

2.   Use set notations to describe numbers.

3.   Use interval notations to represent number sets.

4.   Use real number line to express the number sets.

5.   Use Venn diagram to represent number sets.

6.   Solve linear and simultaneous linear equations using graphical and algebraic methods.

7.   Use simultaneous linear equations to model and solve real world problems.

8.   Recognise prime, rational, irrational and complex numbers

9.   Apply factor theorem to factorise polynomial functions

10.   Solve polynomial equations.

11.   Solve quadratic equations using factorizing, quadratic formula or completing the square method.

12.   Sketch graphs of quadratic functions.

13.   Apply binomial expansion to solve problem in various algebraic contexts.

14.   Simplify rational functions inequalities.

15.   Plot complex numbers in the Argand diagram.

16.   Find the rule for inverse function for given functions and sketch the graph of inverse functions.

17.   Solve system of equations and literal equations.

18.   Use exponential and logarithmic functions to model application problems.

19.   Sketch graphs of exponential and logarithmic functions.

20.   Solve exponential and logarithmic equations.

21.   Convert radians in to degrees and vice versa.

22.   Apply trigonometric ratios in degrees and radians to solve problem in various geometric and analytical geometric contexts.

23.   Apply sine and cosine rule solve to solve problem in various geometric and analytical geometric contexts.

24.   Sketch the graphs of trigonometric functions of sin, cos, tan, sec, cosec and cot

25.   Identify amplitude, period and mid line of $a\sin(bx+c)+d$ and $a\cos(bx+c)+d$

MCD1700 – Introductory Mathematics *CONTINUED*

26. Classify vectors and scalars.

27. Apply vector algebra to solve problems in geometry.

28. Express vectors using i and j components.

29. Express coordinates in Cartesian coordinates

30. Calculated distance between two points

31. Use the formula +to divide a line segment by given ratio.

32. Solve problems related in Parallel and perpendicular lines

33. Recognise angles relating in parallel lines triangles and polygons.

34. Identify congruent and similar triangles.

35. Apply properties of congruent and similar triangles to solve problems in plane geometry and analytical geometry.

36. Recognise rectangle, rhombus, parallelogram and square from complex geometrical diagrams.

37. Apply properties of rectangle, rhombus, parallelogram and square to solve problems in plane geometry and analytical geometry.

Assessments

- Topic Quizzes - 10%
- Test - 15%
- Assignment - 10%
- Tutorial participation - 5%
- Final Examination - 60%

In order to pass this unit, students must:

❖ Achieve at least 65% in the tutorial participation

❖ Achieve at least 40% in the total internal assessments

❖ Achieve at least 40% in the final examination

❖ Achieve an overall mark of 50% or higher

MCD1710 – Introductory Biology

Description

This unit will explore the fundamental processes and patterns common to life on Earth. It will examine how living organisms grow, develop diverse and complex structures and pass on their genetic material to the next generation. The students will progress through principle themes in biochemistry, cellular structure and systems, cell division and reproduction, genetics and evolution, biodiversity and ecosystems. Students will examine how animals and plants, through the agents of gene mutation and natural selection, are able to adapt to new and changing environments. We will then examine how interactions within and between species and with the non-living environment generate the enormous variety of life on Earth.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Identify and describe the concepts, processes and practical applications of cell biology, biochemistry, genetics, molecular biology and processes of evolution in society and everyday human life.

2. Demonstrate proficiency in communicating scientific results through a range of formats (written and oral).

3. Formulate hypotheses, collect experimental data and demonstrate proficiency in interpreting their results.

4. Demonstrate understanding of the use of common life sciences equipment and techniques.

5. Utilise research skills including database searches to synthesise and interpret information related to scientific research, using appropriate conventions for scientific attribution.

6. Work effectively, responsibly, safely and ethically, both individually and in peer or team contexts.

Assessments

- A1: Formative Test Assessment with student-led annotated feedback (weekly) - 20%

- A2: Completed Lab Practicals (6 practicals for submissions) - 30%

- A3: Self Access Quizzes (weekly) - 10%

- A4: In class open book summative Test - 40%

In order to pass this unit, students must achieve an overall mark of 50% or higher.

MCD1570 - Intermediate Mathematics

Description

This unit continues on from MCD1700 Introductory Mathematics. The unit will provide students with the pre-requisite knowledge and skills to progress to the higher levels of mathematics in the STEM diplomas and subsequently in the relevant degree programs.

Prerequisites

MCD1700 Introductory Mathematics

Learning Outcomes

On completion of this unit, students should be able to:

1. Apply the concept of vectors in Cartesian form in analytical geometry.

2. Find and apply position vector, magnitude of vector, unit vector, angles between vectors and direction cosines in two and three-dimensional problems.

3. Determine linear dependency and independency in vectors.

4. Find scalar and vector resolute, scalar product of vectors and solve application questions relating to the concepts.

5. Use Pythagorean identities $\sin^2 \theta + \cos^2 \theta = 1; \ \tan^2 \theta + 1 = \sec^2 \theta; \ 1 + \cot^2 \theta = \csc^2 \theta$ in problem solving.

6. Apply compound-angle identities in various geometric and analytical geometric applications.

7. Find general solutions of simple and complicated trigonometric equations.

8. Apply limits, continuity and differentiation to solve mathematical problems.

9. Identify and analyse the nature of critical points using derivative tests.

10. Apply differentiation concepts in curve sketching.

11. Understand and represent implicit equations as parametric equations.

12. Apply differentiation to both explicit and parametric equations to solve problems in various contexts of engineering and other disciplines.

13. Perform basic anti-differentiation calculations and the technique of integration by substitution.

14. Apply integration techniques to find areas under curves.

Assessments

- Topic Quizzes - 10%
- Test - 15%
- Oral Presentation - 10%
- Tutorial participation - 5%
- Final examination - 60%

In order to pass this unit, students must:

❖ Achieve at least 40% in the total internal assessments

❖ Achieve at least 45% in the final examination

MCD1750 – Intermediate Mathematics *CONTINUED*

❖   Achieve an overall mark of 50% or higher

MCD2080 – Business Statistics

Description

This unit is designed to provide skills in data analysis and statistical processes as applied to business and basic business computations and techniques.

Prerequisites

MCD1110 Data Analysis and MCD1550 Introduction Mathematics for Business or equivalent

(For Business stream only. For Part 2 students, Part 1 pre-requisites are not applicable)

MCD1110 Data Analysis and MCD1230 Applied Mathematics or equivalent

(For Commerce stream only. For Part 2 students, Part 1 pre-requisites are not applicable)

Learning Outcomes

In this unit you will learn to use basic statistical techniques and apply them to problems across a range of areas in business.

On completion of this unit, students should be able to:

1.   interpret business data using descriptive statistics techniques, including the use of Excel spreadsheet functions

2.   apply simple concepts of probability and probability distributions to problems in business decision making

3.   describe the role of statistical inference and apply inference methods to single population means and proportions

4.   interpret and evaluate the relationships between variables for business decision-making, using the concepts of correlation and multiple linear regression

5.   be able to describe. explain, predict/forecasting and control strategies using time series data

6.   to be able to identify components of time series, model and interpret coefficients, and predict equipping you with techniques of forecasting time series data in real life.

7.   Develop skills in spreadsheet modelling and understand how simulation is used to address business problems.

These outcomes are important to a successful career in Business.

MCD2080 – Business Statistics *CONTINUED*

Assessments

Task	Weight
Lecture Practice and Quizzes	15%
Assignment	10% (Week 6)
Tutorial Workshops	15%
Mini Tests	10% (FAT 1: 5%, FAT 2: 5%)
Final Examination	50% (40% hurdle)

* Approved calculator will be allowed for test and exam. Assignment should be done using Excel.

Requirements to Pass the Unit

- In order to achieve a pass in this unit, you must achieve at least 40% (exam hurdle) on the final exam and your overall result must be 50% or higher

- Your overall result combines your internal assessment and your exam results.

- If you receive a 49N grade, you will automatically be awarded a 48N result

Mode of study

This unit is taught in both face-to-face and online modes (subject to the COVID-19 Pandemic and changing situations). There are no work placement components.

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MCD2130 – Functions and Their Applications

Description

The focus of this unit will be on the behavior of functions and examining some of their applications to the real world. The way that functions will be introduced is by individually describing the characteristics of families of different function types (linear, polynomial, rational, exponential, logarithmic and trigonometric). The composition of functions through possible combinations of different types of functions will also be investigated. Other operations on functions such as transformations via shifting, scaling and reflection will be presented, along with the existence and meaning of inverse functions.

This initial part of the course will then be used to provide a foundation for examining the rate of change of a function. Principally this involves defining the elementary principles of differential calculus and then utilising these with respect to the types of functions mentioned above. As a final topic an introduction to integral calculus is presented.

Prerequisites

It is recommended that students have studied Year 11 (or equivalent) Mathematics.

Learning outcomes

On completion of this subject, students will have acquired **knowledge** of:

1.   The notion of functions and their representation as tables, graphs or mathematical expressions;

2.   The basic characteristics of polynomial, rational, exponential, logarithmic and trigonometric functions;

3.   The algebra of functions;

4.   The concepts of composition functions and inverse functions;

5.   The transformation of functions, algebraically and graphically;

6.   The concepts of rate of change of a function and derivative of a function;

7.   The concept of anti-differentiation of a function and its main application: The Fundamental Theorem of Calculus.

And will have developed **skills** in:

●   Identifying different types of functions behaviour by means of neat sketch-graphs; determining basic properties and behaviour of functions by analytic and by means of neat sketch graphs;

●   Using function algebra;

●   Calculating composition functions and inverse functions; using functions as models of real-life behaviour; calculating simple derivatives and integrals; communicating and interpreting mathematical results;

●   and will have developed and/or strengthened the ability to present mathematical arguments in writing.

MCD2130 – Functions and Their Applications CONTINUED

Assessment

Task	Weight
Two Assignments	10% (each worth 5% respectively)
Two Mini Tests	10% (each worth 5% respectively)
Participation	10%
Diagnostic Online Quizzes	10%
Final Examination	60% (40% exam hurdle)

Students must achieve at least 40% in the final examination (exam hurdle) and an overall mark of 50% or higher in order to pass this unit.

MCD4160 - Physics for Engineering

Description

Engineers apply their technical expertise to an enormous variety of situations. In particular, an engineer will develop solutions to problems, design new technologies or utilize existing technologies that require knowledge of both the macro world, wherein classical physics principles prevail and of the quantum underpinnings of the physical world. This unit acquaints students with physics concepts and related engineering applications that bridge all scales of inquiry.

The practical component develops measurement, analysis and communication skills.

Prerequisites

MCD1200 Physics A (For Part 2 entry students, Part 1 pre-requisites are not applicable).

Learning Outcomes

On completion of this unit, students should be able to:

1.   Apply energy and momentum methods to analyse motion of systems.

2.   Explain behaviours involving oscillations and waves and do appropriate analysis and calculations.

3.   Explain, and apply basic quantum principles to, situations which are relevant in engineering and technology contexts; do appropriate analysis and calculations.

4.   Demonstrate an ability to describe and explain advanced techniques used in relevant engineering or physics contexts.

5.   Make reliable measurements, estimate uncertainties, analyse, evaluate and interpret data in cases appropriate to engineering and related to the theory studied.

6.   Show an improved ability to work in teams and to communicate and discuss physics concepts, measurements and applications related to engineering and developments in technologies.

7.   Approach new problems and find solutions on the basis of general principles, and evaluate the appropriateness of their proposed models or solutions.

Assessment

● Quizzes / Assignment - 10%

● Test 1 (Mechanics) - 14%

● Test 2 (Oscillation and Waves) - 14%

● Laboratory Work - 22%

● Final Examination - 40%

In order to pass this unit, students must:

❖ Achieve at least 40% in the total internal assessments

❖ Achieve at least 40% in the final examination

❖ Achieve an overall mark of 50% or higher

MCD4390 – Chemistry 1

Description

This unit has been designed to provide a fundamental understanding, as well as the ability to gain knowledge in different aspects of chemistry including physical chemistry principles theoretical and practical tasks that are relevant to the university level of learning.

Prerequisites

MCD1190 Chemistry A or VCE year 12 Chemistry

Learning Outcomes

On completion of this unit, students should be able to:

1. Discuss the features of atomic structure and the construction of the periodic table of elements.

2. Interpret relationships between electronic structure and bonding.

3. Explore a wide range of molecular structures and investigate aspects of stereochemistry such as isomerism and chirality.

4. Distinguish between ideal gases and real gases.

5. Recognise factors which give rise to polarity and its relationship to intermolecular bonding.

6. Define the first and second laws of thermodynamics and apply enthalpy and entropy.

7. Discuss factors which give rise to chemical kinetics.

8. Apply acid-base chemistry in the understanding of dynamic equilibria.

9. Foster the acquisition of practical skills by exploiting an inquiry-based approach to the chemistry laboratory experience.

10. Communicate chemistry and discuss the social and environmental responsibility of chemists in global community.

Assessment

- Tutorial participation (3x tutorial tests) - 10%
- Laboratory component (Prelab / Reports) - 30%
- Online assessments (12 x pre-workshop quizzes) - 10%
- Final examination - 50%

In order to pass this unit, students must:

❖ Achieve a minimum mark of 40% (12 out of 30) in the lab component

❖ Achieve at least 40% (48 out of 120) in the final examination

❖ Achieve an overall mark of 50% or higher

MCD4400 - Chemistry 2

Description

You will explore the behaviour and characteristics of chemicals through a number of interesting case studies incorporating a range of significant biological and synthetic molecules. Along the way, students will discuss the formation of inorganic coordination complexes and investigate their role in colour and magnetism, and metals in biological systems. The concepts developed within the workshops and tutorials are complemented through a laboratory program where you will have the opportunity to use a variety of analytical techniques to solve a range of chemical problems.

Prerequisites

MCD4390 Chemistry I

Learning Outcomes

On completion of this unit, students should be able to:

1. Demonstrate a basic understanding of chemical nomenclature.

2. Describe the classification, structure and properties of a wide range of organic compounds according to the functional groups they contain.

3. Discuss the properties of transition elements.

4. Describe a wide range of coordination compounds and their structures, reactions and applications in both synthetic materials and biological materials.

5. Employ spectroscopy analysis to investigate molecular structure.

6. Foster practical skills by exploiting an inquiry-based approach to the chemistry laboratory experience.

7. Communicate chemistry, discuss the social and environmental responsibility of chemists in the global community.

Assessments

*   Lab component (Prelabs / Reports) - 30%

*   Online assessment - 10%

*   Tutorial attendance, participation & assessments - 10%

*   Final exam - 50%

In order to pass this unit, students must:

❖   Achieve at least 40% in the lab practical component

❖   Achieve an overall mark of 50% or higher

MCD4410 – Blueprints for Life

Description

This unit will explore the fundamental processes and patterns common to all life on Earth. It will examine how living organisms grow, develop diverse and complex structures, harness and utilize energy and transmit their life blueprints to the next generation. In this unit, students will progress through fundamental themes in cellular biology, biochemistry, genetics, genomics and microbiology. They will examine contemporary issues in biological sciences and the societal impact that biology has by learning from world-class researchers and industry experts.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Identify and describe the concepts, processes and practical applications of cell biology, biochemistry, genetics, molecular biology and microbiology in society and everyday human life

2. Demonstrate proficiency in communicating scientific results through a range of formats (written and oral)

3. Formulate hypotheses, collect experimental data and demonstrate proficient in interpreting their results

4. Demonstrate competence and precision in the use of common life sciences equipment and techniques

5. Utilize research skills including database searches to synthesise and interpret information related to scientific research, suing appropriate conventions for scientific attribution

6. Work effectively, responsibly, safely and ethically, both individually and in peer or team contexts

Assessments

- A1: Weekly Assessment Quizzes and Active Participation - 18%

- A2: Practical Assessments - 32%

- A3: Final Examination - 50%

In order to pass this unit, students must:

❖ Achieve a minimum mark of 40% in the Weekly Assessment Quizzes and Active Participation

❖ Achieve an overall mark of 50% or higher

MCD4420 – Life on Earth

Description

This unit views the extraordinary diversity of life on Earth through the prism of evolutionary theory and in the context of human and environmental health. Students will examine how animals and plants, through the agents of gene mutation and natural selection, are able to adapt to new and changing environments. Diverse physiological, reproductive and behavioural solutions to life's challenges will be used to illustrate how evolutionary forces and constraints shape us and the world around us. We will then examine how interactions within and between species and with the non-living environment generate the immense ecological variety seen on Earth. Contemporary issues and the societal impact of biology will be explored by learning from world-class researchers and industry experts.

Students will undertake self-directed learning through the online environment. These online activities, readings and instructional videos will be complemented by face-to-face workshops where they will collaborate with peers and teaching staff to deepen their understanding of the biological concepts introduced each week. Students will gain hands-on experience and develop experimental and analytical skills in the laboratory environment.

Prerequisites

MCD4410 Blueprints for Life

Objectives

On completion of this unit, students should be able to:

1. Identify and describe the role of biological concepts and processes of evolution, plant and animal physiology, reproduction and life history strategies and core ecological concepts in society and everyday human life.

2. Demonstrate proficiency in communicating scientific results through a range of formats (written and oral).

3. Formulate hypotheses, collect experimental data and demonstrate proficiency in interpreting their results.

4. Demonstrate understanding of the use of common life sciences equipment and techniques.

5. Utilise research skills including database searches to synthesise and interpret information related to scientific research, using appropriate conventions for scientific attribution.

6. Work effectively, responsibly, safely and ethically, both individually and in peer or team contexts.

Assessment

-   Weekly Assessment Quiz and Active Participation - 18%

-   Practical Assessment - 32%

-   Examination - 50%

In order to pass this unit, students must:

❖   Achieve a minimum mark of 40% in the Weekly Assessment Quizzes and Active Participation

❖   Achieve an overall mark of 50% or higher

MCD4500 – Engineering Mathematics

Description

Vector algebra and geometry: equations of lines and planes. Linear algebra: matrix operations, up to 3x3 systems of linear equations, eigenvalues and eigenvectors. Calculus: improper integrals, integration by parts. Sequences and series: fundamentals of convergence, Taylor series, use in error analysis. Ordinary differential equations: first order, second order with constant coefficients, repeated roots, simple non-homogeneous cases. Laplace transforms: elementary functions, inversion by tables; shifting; derivatives, applications to ODEs. Multivariable calculus: partial derivatives, gradient and directional derivatives, maxima and minima.

Prerequisites

MCD4490 Advanced Mathematics

Objectives

On completion of this unit, students should be able to:

1. Evaluate cross products of vectors and use vectors to represent lines and planes.

2. Perform matrix algebra.

3. Solve up to 3x3 systems of linear equations and find eigenvalues and eigenvectors.

4. Use hyperbolic functions.

5. Evaluate improper integrals of elementary functions and use integration by parts.

6. Appreciate convergence of numeric and power series, construct Taylor series and estimate errors in numerical approximations.

7. Solve first order ordinary differential equations, including by separable variables and integrating factors.

8. Solve second order linear differential equations with constant coefficients.

9. Use differential equations to model simple engineering problems.

10. Evaluate and invert Laplace transforms and use them to solve ordinary differential equations.

11. Calculate partial derivatives, use the gradient vector to find directional derivatives and find extreme values of two-variable functions.

12. Express and explain mathematical techniques and arguments clearly in words.

Assessment

- Assignment 1 - 5%
- Test - 10%
- Assignment 2 - 5%
- Lecture quiz and attendance - 10%
- Tutorial participation - 10%
- Examination - 60%

MCD4500 – Engineering Mathematics *CONTINUED*

In order to pass this unit, students must:

- ❖ Attempt all internal assessments and achieve at least 40% in the total internal assessments

- ❖ Achieve at least 40% in the final examination

- ❖ Achieve an overall mark of 50% or higher

MCD6080 – Psychology 1A

Description

This unit provides students with an introduction to the broad foundations of psychology as a scientific discipline. It begins with an exploration of psychology's historical origins. Then, a series of core psychological topics will be introduced: concepts of health, stress and coping will be considered along with the distinguishing features of abnormal psychology and the biological basis of behaviour.

The unit also introduces theories of learning, memory and development and familiarizes students with key aspects of Indigenous and cross-cultural psychology. Students will also be introduced to academic writing by reporting findings through reading journal articles.

Prerequisites

Nil

Objectives

On completion of this unit, students should be able to:

1. Identify key historical and philosophical developments which have resulted in the modern discipline of psychology;

2. Identify and describe key concepts underlying biological, learning, developmental and cross-cultural psychology, stress and coping and abnormal psychology;

3. Apply the knowledge and concepts of biological, learning, developmental and cross-cultural psychology, stress and coping and abnormal psychology to assessable quizzes and critical thinking assignment;

4. Outline the need for an objective understanding of human behaviour;

5. Prepare written technical and scientific documentations and present key findings.

Assessment

- **A1:** Oral Video presentation – 30%
- **A2:** Argumentative essay – 40%
- **A3:** Weekly online tests – 30%

Students must achieve an overall mark of 50% or higher in order to pass this unit.

Unit Guide

Diploma of Science – Education Specialisation

MCD8010 – Working in Education: An Introduction to the Profession

Description

The aim for this unit is for students to learn about contemporary learning theories that enable students to reflect on their own learning experiences in order to understand how others learn. From the perspective of broader educational settings (school, community, early childhood setting, home) the important question of what learning is: how and why learning occurs, what quality learning might be and what influences learning, are discussed and reflected upon.

Through examination of different theoretical perspectives and contexts, this unit focuses on building an understanding of what can influence learning and offers skill building in academic learning. Ideas closely associated with learning, including motivation, engagement and ability are also considered. The unit encourages the students to begin constructing deep knowledge about the relationship between learning and educational inquiry.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Show an understanding of the structures, policies, behaviours, practices and requirements of the profession

2. Orient yourself as an emerging professional within a range of frameworks and legislation that guide the profession of teaching, including curriculum, child safety, teacher standards, improvement frameworks and relevant codes of conduct and ethics

3. Demonstrate a developing understanding of the everyday practices, routines and roles connected to teaching as a profession

4. Articulate your professional obligations, emerging orientations and educational philosophies

5. Exhibit a range of personal and interpersonal capabilities that meet or exceed professional expectations

6. Showcase foundational knowledge, skills and understandings of concepts associated with the work of teaching (curriculum, planning, pedagogy, assessment, reporting)

7. Demonstrate understanding of a range of communication skills required in educational and professional settings.

Assessments

Task	Weight
A1.1: Lantite quizzes and academic response (Wk 1-3)	10%
A1.2: Professional experience preparation	15%
A1.3: Case study critique	15%
A2: Teacher concept map	60%

Students must attempt A2 and achieve an overall mark of 50% or higher in order to pass this unit.

MCD8020 – Approaches to Teaching and Learning

Description

This unit builds on the focus on learning and educational inquiry skills in MCD8010 Working in Education: An Introduction to the Profession. It introduces contemporary approaches to teaching and ways to investigate such approaches. It encourages students to explore and examine teaching relationships including modes of communication, teaching models and strategies, as well as the management or organization of learning situations. From the perspective of broader educational settings (school, community, early childhood settings, home) learning and assessment tasks require students to analyse and reflect on teaching and learning processes within diverse educational contexts and consider the implications of the Australian curriculum on effective teaching and learning.

Prerequisites

MCD8010 – Working in Education: An Introduction to the Profession

Learning Outcomes

On completion of this unit, students should be able to:

1. Demonstrate knowledge of a variety of teaching approaches and resources to accommodate a range of abilities and interests

2. Practice and apply effective goal setting, worked examples, collaborative learning, questioning, feedback and metacognitive approaches to teaching and learning

3. Utilise research-informed evidence base to critique or justify a range of teaching and learning approaches within scenarios/case studies or role-playing

4. Plan and deliver an effective whole group teaching and learning episode, demonstrating a rationale and effective application of core pedagogical approaches

5. Illustrate emerging approaches and techniques to positively and effectively manage teaching and learning contexts (i.e. teacher presence, learner management, resource management, discourse practices)

6. Demonstrate understanding of a range of communication skills required in educational and professional settings.

Assessments

Task	Weight
A1A: Case study response **A1B:** Expert response and reflection	40%
A2A: Remote learning lesson plan **A2B:** Small group teaching and learning	60%

Students must attempt A2 and achieve an overall mark of 50% or higher in order to pass this unit.

Unit Guide

Diploma of Science – Education Specialisation

MCD8030/40 – Primary / Secondary Professional Experience 1A

Description

This unit assesses the students' primary or secondary professional experience in the first trimester. Students complete the required number of days and the activities specified in the unit guide. Students' learning is supported by relevant academic staff in Monash College, and by teacher mentors in the education setting in which they are placed.

Prerequisites

Nil

Learning Outcomes

On completion of this unit, students should be able to:

1. Complete the required number of days of professional experience and the activities specified in the unit guide.

2. Document their professional learning through means such as a professional experience folder which records lesson planning, self-reflections and an evaluation on developing practice.

3. Achieve a satisfactory level of progress in their development as teachers in line with the requirements outlined in the unit guide and the placement report.

Requirements

Pre-service teachers are required to undertake 5 days in each trimester.

Year	Trimester	Unit	Placement	Number of days	Dates
1	1	MCD8030/40	Primary / Secondary School setting	5 days over one week	TBC

Pre-service students must satisfactorily complete the number of days set out in the placement time table (see table above).

Assessments and Submission Requirements

1. PE Report (via MCD8030 Survey Campaign link).
2. Placement Observation Handbook.

MCD8050/60 – Primary / Secondary Professional Experience 1B

Description

This unit assesses the students' primary or secondary professional experience in the second trimester. Students complete the required number of days and the activities specified in the unit guide. Students' learning is supported by relevant academic staff in Monash College, and by teacher mentors in the education setting in which they are placed.

Prerequisites

MCD8010 – Working in Education: An Introduction to the Profession

MCD8030/40 – Primary / Secondary Professional Experience 1A

Learning Outcomes

On completion of this unit, students should be able to:

1. Complete the required number of days of professional experience and the activities specified in the unit guide

2. Document their professional learning through means such as a professional experience folder which records lesson planning, self-reflections and an evaluation on developing practice

3. Achieve a satisfactory level of progress in their development as teachers in line with the requirements outlined in the unit guide and the placement report.

Requirements

Pre-service teachers are required to undertake 5 days in each trimester.

Year	Trimester	Unit	Placement	Number of days	Dates
1	2	MCD8050/60	Primary / Secondary School setting	5 days over one week	TBC

Pre-service students must satisfactorily complete the number of days set out in the placement time table (see table above).

Assessments and Submission Requirements

1. PE Report (via MCD8050/60 Survey Campaign link).

2. Placement Observation Handbook.