
SCIENCE
FOUNDATIONS
Building Knowledge.
Inspiring Innovation.
Shaping Tomorrow.
DISCOVER
New Frontiers
INNOVATE
For a Better Tomorrow
INSPIRE
The Next Generation
IMPACT
The World We Live In

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## Principal's Message

Dr John Tholen held several senior appointments at private and public academic institutions in Singapore and P.R. China where he designed and developed foundation studies to facilitate academic progression into the life science degree programmes. The Certificate in Foundation Science was given excellent reviews by Australian and UK universities. Students who successfully complete the Science Foundation Studies are deemed to have met the academic requirement and initial literacy requirements for direct entry into life science degree programs. However, it is expected that students seeking placement on campus will have attained an English proficiency not less than IELTS 6.0.

The course has two main aims. The first is to develop students' functional literacy within an academic context. Particular attention will be given to the skills of reading, writing, listening and speaking, which are deemed necessary for success at university. The second is to increase the students' knowledge and understanding of scientific concepts and terminology as a further preparation for admission into science, engineering and technology degree programmes.

## RATIONALE

1. **Pathway to higher education**
   Students are guaranteed a place in the undergraduate degree of their choice if they achieve the academic and English language grades set by the university.

2. **A pathway designed for your academic success**
   Teaching content and method are designed to prepare students, from a variety of educational backgrounds, for future undergraduate studies at university.
3. **International Recognition**
   On completion of the foundation studies, students are awarded certificates that are recognized internationally for admission into most British and Australian university degree programmes.
4. **Extensive Student Support**
   In addition to regular classes, students have access to small-group tutorial support and can seek individual consultation with academic staff.

## COURSE CONTENT

The program is comprised of the following modules and offered in a modular format in UK English. Please refer to the Student Handbook and Science Foundation website for full details regarding lecture synopses, regulations and conduct.

Mathematics (Calculus based)

Chemistry

Biology

Physics and

Economics

## COURSE DURATION

Lectures will be given on a daily basis, Monday to Friday

Each lecture will be presented over two hours duration

At the end of lectures, there will a final exam for that module. Note: all assessments will be conducted in English.

| Module | Week | Event |
|---|---|---|
| **Mathematics** | 1-4 | Lectures |
| | 5-7 | Recess |
| | 8 | Exam |
| **Chemistry** | 9-14 | Lectures |
| | 15-17 | Recess |
| | 18 | exam |
| **Biology** | 19-22 | Lectures |
| | 23-25 | Recess |
| | 26 | Exam |
| **Physics** | 27-30 | Lectures |
| | 31-33 | Recess |
| | 34 | Exam |
| **Economics** | 35-38 | Lectures |
| | 39-41 | Recess |
| | 42 | Exam |

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## ASSESSMENTS

Please refer to the Student Handbook regarding serious acts of academic fraud and plagiarism. Plagiarism is a malpractice where a person claims ownership of another person's work. Plagiarism includes such acts as not detailing any or all relevant information concerning a published author's work inclusive of collusion, falsification of data, and false citation.

## MODULE DESCRIPTORS

Please refer to the Science Foundations website for lecture synopses.

### MATHEMATICS

#### Introduction

Studying and practicing Maths is the BEST way to learn how to think logically and carefully, and present ideas and arguments clearly and concisely.

These are skills that you will use every day in your career as a scientist or engineer.

It is vital to do loads and loads of exercises on the techniques, so that when it comes to real problems you only have to worry about which techniques to use.

#### Module Details

| Study | Lectures | Tutorials | Exam (2) | Study Recess |
|---|---|---|---|---|
| **Hours** | 40 | 15 | 1.5 | 3-weeks |

#### Assessment

| Assessment | Assignment 1 | Midterm Exam | Assignment 2 | Final exam |
|---|---|---|---|---|
| **Score** | 10% | 20% | 10% | 60% |

**Content**

The mathematics module begins by building a strong algebraic foundation, covering functions and graphs, partial fractions, inequalities and the modulus function, logarithmic and exponential functions, matrices and determinants, and sequences and series. These early lectures establish the core toolkit students need before progressing to more advanced topics.

From there, the course moves into trigonometry and calculus, starting with trigonometric relations and functions before introducing differentiation, limits, and integration, followed by their practical applications. This sequence gives students a solid grounding in both the theory and real-world use of calculus.

The module then introduces permutations and combinations, vectors, mathematical induction, curve sketching, and complex numbers, broadening students' problem-solving techniques across a wider range of mathematical structures.

Building on this, students explore first order differential equations and numerical methods, before applying mathematical principles to mechanics — including forces and equilibrium, linear motion, energy, work and power, and the motion of projectiles.

The course concludes with a strong statistics component, covering probability, discrete and continuous random variables, the normal distribution, and sampling and hypothesis testing — equipping students with the statistical literacy needed for scientific research and data analysis.

**CHEMISTRY**

**Introduction**

This module is designed for those students who are planning to gain admission into life science degree programs offered at foreign tertiary institutions. The Chemistry module aims to equip students with a sound knowledge of the fundamental aspects of Chemistry to a level that is equivalent to GCE A level or minimal HSC syllabus.

**Module Details**

| Study | Lectures | Practical | Exam (1) | Study Recess |
|---|---|---|---|---|
| **Hours** | 40 | 10 | 1.5 | 3-weeks |

**Assessments**

| Assessment | Assignment | Practical reports | Final exam |
|---|---|---|---|
| **Score** | 30% | 20% | 50% |

**Module Content**

The Chemistry module opens with the fundamentals of matter and atomic structure, covering states of matter, atomic theory and electronic structure, and electron configurations in relation to the periodic table. From there, students examine chemical bonds, electronegativity, and inductive effects, building the theoretical foundation needed to understand how and why atoms interact.

The course then turns to chemical reactivity, introducing chemical equations, energetics, equilibrium and kinetics, and reaction rates, before exploring solubility and partition behaviour. This is followed by ionic equations, acids and bases, and chemical analysis and titrations — giving students both the theory and practical laboratory skills for quantitative chemistry.

Students next study gas laws, phases and chemical potentials, followed by oxidation and reduction reactions and thermodynamics, rounding out the physical chemistry component. A lecture on isotopes and radioactivity introduces nuclear chemistry, before a review of structure and bonding consolidates the concepts covered so far.

The module concludes with an introduction to organic chemistry, covering hydrocarbons, isomers, and reaction mechanisms — equipping students with a working understanding of organic molecular behaviour as a foundation for further study.

**BIOLOGY**

**Aim**

The aim of this module is to introduce students to the broad scope of the biological sciences and to develop an understanding of the concepts of biological organization and function at different levels.

**Learning Outcomes**

After studying this module, you should have acquired the following knowledge and skills:

Recognize the main levels within a taxonomic hierarchy and be able to describe the general features of all the kingdoms and selected phyla and classes. Students will also be able to discuss the principles of natural selection and its role in evolution and the principles of tropic interaction and population dynamics. You will have acquired an understanding of the fundamental life processes common to all living things and be able to discuss the metabolic processes underlying living systems.

Students will recognize the prokaryotic and the eukaryotic level of organization and be able to describe the structure and function of characteristic organelles. You will also be able to describe the structure and discuss the significance of viruses. The Human Biology component of this module will provide students with an understanding of human physiology. Students will be able to identify the human anatomy and discuss there function.

**Module Details**

| **Study** | **Lectures** | **Practical** | **Exam (1)** | **Study Recess** |
|---|---|---|---|---|
| **Hours** | 60 | 10 | 1.5 | 3-weeks |

**Module Assessment**

| Assessment | Assignment | Practical reports | Final exam |
|---|---|---|---|
| **Score** | 30% | 20% | 50% |

**Module Topics**

| | | | |
|---|---|---|---|
| Lecture 1 | Cell Structure | Lecture 16 | Mutations in Genes |
| Lecture 2 | Membranes | Lecture 17 | Chromosomal Mutations |
| Lecture 3 | Cell Surface Molecules | Lecture 18 | Diversity and Evolution |
| Lecture 4 | Viruses | Lecture 19 | Introduction to Ecology |
| Lecture 5 | Molecules of Life | Lecture 20 | Homeostasis |
| Lecture 6 | Molecules of Life II | Lecture 21 | Circulatory System |
| Lecture 7 | DNA, RNA and Protein I | Lecture 22 | Immunology |
| Lecture 8 | DNA, RNA and Protein II | Lecture 23 | Digestive System |
| Lecture 9 | Enzyme Classifications | Lecture 24 | Renal Physiology |
| Lecture 10 | Enzyme Kinetics | Lecture 25 | Central Nervous System |
| Lecture 11 | Cellular Respiration | Lecture 26 | Peripheral Nervous System |
| Lecture 12 | Photosynthesis | Lecture 27 | Synapse and Neurotransmitters |
| Lecture 13 | Mitosis and Meiosis | Lecture 28 | Endocrine System |
| Lecture 15 | Inherited Change | Lecture 29 | Muscle Physiology |
| | | Lecture 30 | Reproduction |

**PHYSICS**

## Aim

The aim of the Physics module is to develop a general knowledge of the subject to a level appropriate for anyone planning a career in a scientific field with particular emphasis on topics that are likely to be useful in the future studies. It also aims to give students a secure background in mathematical techniques and develop students' ability to critically analyze problems and formulate well-reasoned solutions.

## Module details

| Study | Lectures | Practical | Exam (2) | Study Recess |
|---|---|---|---|---|
| **Hours** | 40 | 6 | 1.5 | 3-weeks |

**Assessment**

| Assessment | Midterm Exam | Practical reports | Final exam |
|---|---|---|---|
| **Score** | 30% | 20% | 50% |

**Module Content**

The Physics module begins with the foundations of measurement and mechanics, covering measurement and problem solving, velocity and acceleration, vectors and projectiles, forces and friction, and two-dimensional and periodic motion. This sequence introduces students to Newton's laws, circular and rotary motion, and harmonic motion, before consolidating these ideas through the conservation of energy and momentum. The course then moves into the physical properties of matter and heat, examining the phases of matter, heat measurements, and heat engines — covering thermal expansion, gas laws, the laws of thermodynamics, and the mechanics of engines from steam turbines to jet propulsion.

Students next explore wave phenomena, beginning with the general nature of waves before specialising into sound waves and their characteristics. This leads into a substantial study of light and optics, spanning the nature of light, reflection, refraction, and diffraction and polarization — covering everything from mirror and lens optics to interference patterns and the dual wave-particle nature of light.

The module then shifts into electricity and magnetism, starting with electrostatics and direct-current circuits, followed by the heating and chemical effects of electric current, magnetic effects, and electromagnetic induction. This builds toward alternating-current circuits and electronic devices, covering vacuum tubes, transistors, and semiconductor behaviour.

The course concludes with modern and atomic physics, covering atomic structure and nuclear reactions — including radioactivity, fission, fusion, and nuclear power — before finishing with an introduction to relativity, the quantum and chaos, touching on quantum mechanics, particle accelerators, detection instruments, and the classification of subatomic particles.

## ECONOMICS

### Aim

The syllabus aims to provide candidates with opportunities to:

- develop the skills of analysis, application, data handling, communication and evaluation;
- see how choices are made in a market economy and to realize that such choices are interrelated and interdependent;
- develop the ability to analyze and describe the strengths and weaknesses of the market economy and the role of government in attempting to correct market failures;
- develop a working knowledge of the methods of economic enquiry and the economist's way of thinking;
- develop
    (i) a facility for self-expression, not only in writing but also in using additional aids such as statistics and diagrams where appropriate,
    (ii) the habit of using works of reference as sources of data specific to economics,

(iii) the habit of reading critically to gain information about the changing economy in which they live;

- develop the ability to make effective use of terminology, concepts and methods relevant to the subject of Economics and to recognize the strengths and limitations of ideas used.

## Module details

| Study | Lectures | Tutorial | Exam (2) | Study Recess |
|---|---|---|---|---|
| **Hours** | 40 | 10 | 1.5 | 3-weeks |

### Assessment

| Assessment | Midterm Exam | Assignment | Final exam |
|---|---|---|---|
| **Score** | 20% | 30% | 50% |

### Module Description

The economics modules covers three main topics: microeconomics, macroeconomics and econometrics.

a) The microeconomics course focuses on consumer and producer theory, as well as general equilibrium theory with applications to international trade.

b) The macroeconomics course consists of four parts: growth and business cycles, inflation and unemployment, saving, investment and money, and open economy macroeconomics.

c) The econometrics course covers ordinary least squares regression analysis, as well as sample survey methods and methods for the measur