**Stage 6 Science Courses.**

NSW Education Standards Authority (NESA) Stage 6 syllabuses have been developed to provide students with opportunities to further develop skills which will assist in the next stage of their lives.

**The purpose of Stage 6 syllabuses is to:**

* develop a solid foundation of literacy and numeracy
* provide a curriculum structure which encourages students to complete secondary education at their highest possible level
* foster the intellectual, creative, ethical and social development of students, in particular relating to:
  + application of knowledge, understanding, skills, values and attitudes in the fields of study they choose
  + capacity to manage their own learning and to become flexible, independent thinkers, problem-solvers and decision-makers
  + capacity to work collaboratively with others
  + respect for the cultural diversity of Australian society
  + desire to continue learning in formal or informal settings after school
* provide a flexible structure within which students can meet the challenges of and prepare for:
  + further academic study, vocational training and employment
  + changing workplaces, including an increasingly STEM-focused (Science, Technology, Engineering and Mathematics) workforce
  + full and active participation as global citizens
* provide formal assessment and certification of students’ achievements
* promote the development of students’ values, identity and self-respect.

**DEPTH STUDIES**

Please note that all Stage 6 Science courses now include a Depth Study. This Study is student directed and chosen by the student. It may be an extension of the syllabus studied or solely interest based.

It can be an investigation, Data Analysis, Video Game or Movie presentation, a Research Report or a Play or even a Claymation or scale models. There is no limit to the number or style of tasks that can be completed. Students may choose to do one task for the time allocated to their Depth Study or multiple smaller tasks.

Biology, Chemistry and Physics include Depth Studies of 15 indicative hours, whereas Investigating Science includes a Depth Study of 30 indicative hours.

**Biology**

**Knowledge and Understanding Objectives**

Year 11 students:

* develop knowledge and understanding of the structure and function of organisms
* develop knowledge and understanding of the Earth’s biodiversity and the effect of evolution.

Year 12 students:

* develop knowledge and understanding of heredity and genetic technologies
* develop knowledge and understanding of the effects of disease and disorders.

**Requirements for Practical Investigations**

Scientific investigations include both practical investigations and secondary-sourced investigations. Practical investigations are an essential part of the Year 11 course and must occupy a minimum of 35 hours of course time, including time allocated to practical investigations in depth studies.

Practical investigations include:

* undertaking laboratory experiments, including the use of appropriate digital technologies
* fieldwork.

Secondary-sourced investigations include:

* locating and accessing a wide range of secondary data and/or information
* using and reorganising secondary data and/or information.

One fieldwork exercise must be completed in Year 11.

**Course structure and Requirements**

| **Year 11 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 1** - Cells as the Basis of Life | 60 | \*15 hours  in Modules 1–4 |
| **Module 2 -** Organisation of Living Things |
| **Module 3** - Biological Diversity | 60 |
| **Module 4** - Ecosystem Dynamics |

| **Year 12 course**  **(120 hours)** | **Working Scientifically Skills** | **Module** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 5 -** Heredity | 60 | \*15 hours in Modules 5–8 |
| **Module 6** - Genetic Change |
| **Module 7** - Infectious Disease | 60 |
| **Module 8 -** Non-infectious Disease and Disorders |

**Chemistry**

**Knowledge and Understanding Objectives**

Year 11 students:

* develop knowledge and understanding of the fundamentals of chemistry
* develop knowledge and understanding of the trends and driving forces in chemical interactions.

Year 12 students:

* develop knowledge and understanding of equilibrium and acid reactions
* develop knowledge and understanding of the applications of chemistry.

**Requirements for Practical Investigations**

Scientific investigations include both practical investigations and secondary-sourced investigations. Practical investigations are an essential part of the Year 11 course and must occupy a minimum of   
35 hours of course time, including time allocated to practical investigations in depth studies.

Practical investigations include:

* undertaking laboratory experiments, including the use of appropriate digital technologies
* fieldwork.

Secondary-sourced investigations include:

* locating and accessing a wide range of secondary data and/or information
* using and reorganising secondary data and/or information. (Year 11)
* locating and accessing a wide range of secondary data and/or information using and reorganising secondary data and/or information. (Year 12)

**Course Structure and Requirements**

| **Year 11 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 1**  Properties and Structure of Matter | 60 | \*15 hours  in Modules 1–4 |
| **Module 2**  Introduction to Quantitative Chemistry |
| **Module 3**  Reactive Chemistry | 60 |
| **Module 4**  Drivers of  Reactions |

| **Year 12 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 5**  Equilibrium and Acid Reactions | 60 | \*15 hours  in Modules 5–8 |
| **Module 6**  Acid/base Reactions |
| **Module 7**  Organic Chemistry | 60 |
| **Module 8**  Applying  Chemical Ideas |

**Investigating Science**

**Knowledge and Understanding Objectives**

Year 11 students:

* develop knowledge and understanding of cause and effect
* develop knowledge and understanding of models, theories and laws.

Year 12 students:

* develop knowledge and understanding of science and technology
* develop knowledge and understanding of contemporary issues involving science.

**Requirements for Practical Investigations**

Scientific investigations include both practical investigations and secondary-sourced investigations. Practical investigations are an essential part of the Year 11 course and must occupy a minimum of 35 hours of course time, including time allocated to practical investigations in depth studies.

Practical investigations include:

* undertaking laboratory experiments, including the use of appropriate digital technologies
* fieldwork.

Secondary-sourced investigations include:

* locating and accessing a wide range of secondary data and/or information
* using and reorganising secondary data and/or information.

**Course Structure and Requirements**

| **Year 11 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 1 -** Cause and Effect – Observing | 60 | \*30 hours  in Modules 1–4 |
| **Module 2 -** Cause and Effect – Inferences and Generalisations |
| **Module 3 -** Scientific Models | 60 |
| **Module 4 -** Theories and Laws |

| **Year 12 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 5 -** Scientific Investigations | 60 | \*30 hours  in Modules 5–8 |
| **Module 6 -** Technologies |
| **Module 7 -** Fact or Fallacy? | 60 |
| **Module 8 -** Science and Society |

**Physics**

**Knowledge and Understanding Objectives**

Year 11 students:

* develop knowledge and understanding of fundamental mechanics
* develop knowledge and understanding of energy.

Year 12 students:

* develop knowledge and understanding of advanced mechanics and electromagnetism
* develop knowledge and understanding of the role of evidence and prediction in the development of theories in physics.

**Requirements for Practical Investigations**

Scientific investigations include both practical investigations and secondary-sourced investigations. Practical investigations are an essential part of the Year 11 course and must occupy a minimum of 35 hours of course time, including time allocated to practical investigations in depth studies.

Practical investigations include:

* undertaking laboratory experiments, including the use of appropriate digital technologies
* fieldwork.

Secondary-sourced investigations include:

* locating and accessing a wide range of secondary data and/or information
* using and reorganising secondary data and/or information.

**Course structure and Requirements**

| **Year 11 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 1** - Kinematics | 60 | \*15 hours  in Modules 1–4 |
| **Module 2**  - Dynamics |
| **Module 3** - Waves and Thermodynamics | 60 |
| **Module 4** - Electricity and Magnetism |

| **Year 12 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 5 -** Advanced Mechanics | 60 | \*15 hours  in Modules 5–8 |
| **Module 6 -** Electromagnetism |
| **Module 7** - The Nature of Light | 60 |
| **Module 8** - From the Universe to the Atom |

**Earth and Environmental Science**

**Knowledge and Understanding Objectives**

Year 11 students:

● develop knowledge and understanding of the Earth’s systems

● develop knowledge and understanding of the Earth’s processes and human impacts.

Year 12 students:

● develop knowledge and understanding of the evolving Earth

● develop knowledge and understanding of the impacts of living on the Earth

**Requirements**

Scientific investigations include both practical investigations and secondary-sourced investigations. Practical investigations are an essential part of the Year 11 course and must occupy a minimum of 35 hours of course time, including time allocated to practical investigations in depth studies.

Practical investigations include: ● undertaking laboratory experiments, including the use of appropriate digital technologies AND ● fieldwork.

Secondary-sourced investigations include: ● locating and accessing a wide range of secondary data and/or information

AND ● using and reorganising secondary data and/or information. One fieldwork exercise must be included in Year 11 & 12.

**Course structure and Requirements**

| **Year 11 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 1**  Earth’s Resources | 60 | \*15 hours  in Modules 1–4 |
| **Module 2**  Plate Tectonics |
| **Module 3**  Energy Transformations | 60 |
| **Module 4**  Human Impacts |

| **Year 12 course**  **(120 hours)** | **Working Scientifically Skills** | **Modules** | **Indicative hours** | **Depth studies** |
| --- | --- | --- | --- | --- |
| **Module 5**  Earth’s Processes | 60 | \*15 hours  in Modules 5–8 |
| **Module 6**  Hazards |
| **Module 7**  Climate Science | 60 |
| **Module 8**  Resource Management |

**Science Extension for Year 12 only**

**Knowledge and Understanding Objectives**

Students:

* apply the Working Scientifically processes as they are practised by the scientific community
* develop extensive knowledge and understanding about the development of scientific inquiry and research
* develop extensive understanding of the nature of, and the application and processes involved in, modern scientific research
* develop and apply comprehensive knowledge, understanding and skills, to a specific area of science informed by researching, manipulating and analysing primary and secondary-sourced data in relation to relevant publicly available data sets
* develop and apply extensive knowledge, understanding and skills in regard to the current methods of communicating scientific ideas through scientific research

**Requirements**

Prerequisite courses for entry into Science Extension Year 12 are one of, or a combination (up to 6 units of study) of, Biology, Chemistry, Earth and Environmental Science, Investigating Science or Physics in Year 11.

Co-requisite courses for Science Extension Year 12 are one of, or a combination (up to 7 units of study) of, Biology, Chemistry, Earth and Environmental Science, Investigating Science or Physics in Year 12.

Students will need to have appropriate access to the internet and a computer during the HSC examination. This access is also required to support aspects of class and study time.

Students must propose and develop a research question, formulate a hypothesis and develop evidence-based responses in the form of a Scientific Research Report, which is supported by a Scientific Research Portfolio.

|  |  |  |  |
| --- | --- | --- | --- |
| **Year 12 Course**  **1 Unit**  **(60 hours)** | Students develop a response to a scientific research question that requires the analysis of data from one, or a combination of, the disciplines of Science | | |
| **Modules** | **Indicative**  **hours** | **Scientific Research Project** |
| **Module 1**  The Foundations of Scientific Thinking | 10 | Establish an area for scientific research  🡻  Formulate the hypothesis for research  🡻  Find or generate the data  Apply methodologies to analyse the data  🡻  Develop the Scientific Research Report and respond to the hypothesis  🡻 |
| **Module 2**  The Scientific Research Proposal | 10 |
| **Module 3**  The Data, Evidence and Decisions | 20 |
| **Module 4**  The Scientific Research Report | 20 |
| **Mandatory Scientific Research Report and Portfolio** | | |