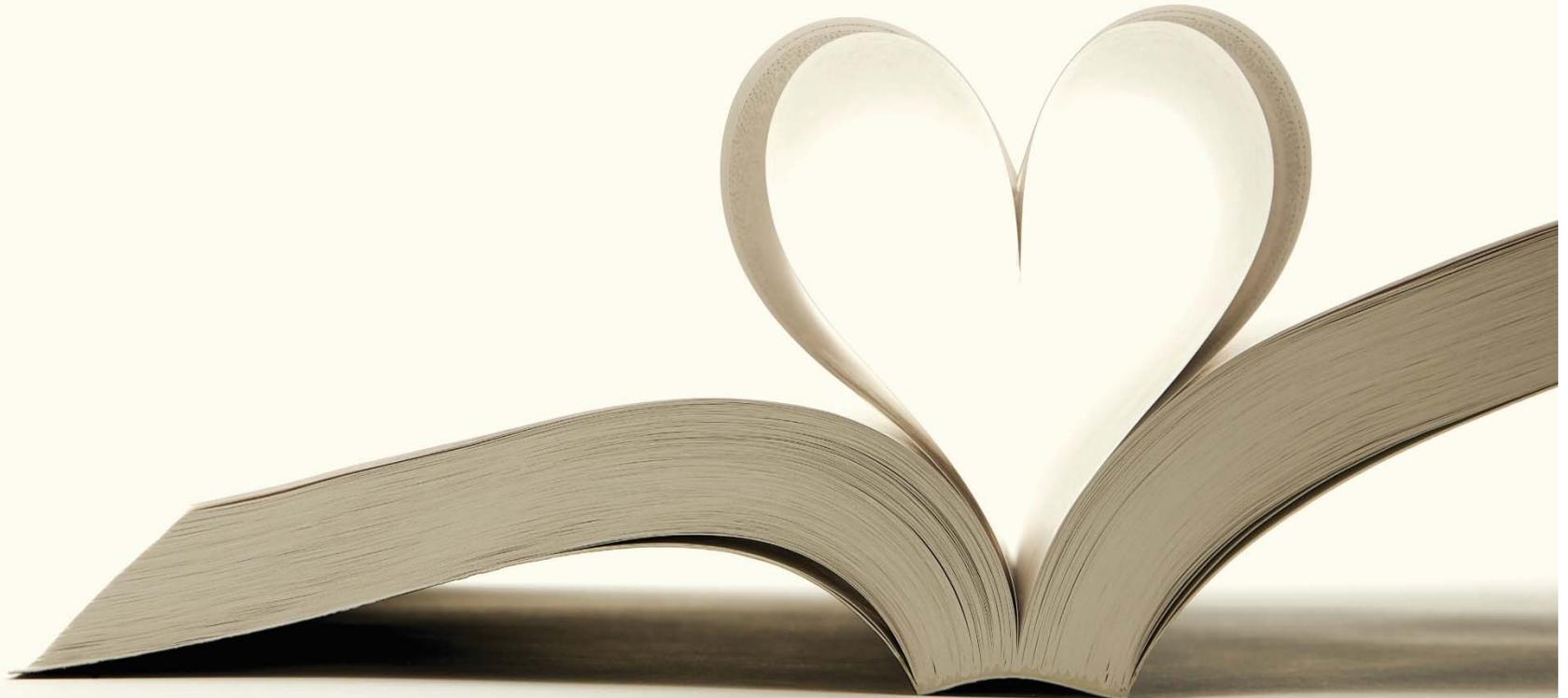


HSC Science



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Year 10 Subject Selection Evening 2017



THE NEW HSC: SCIENCE

- The new Syllabus for Stage 6 (Years 11 and 12) in Science has been developed by the newly named NSW Educational Standards Authority.
- This new syllabus will affect Year 10, who will be the first cohort to present for the new HSC starting in 2018.
- The new syllabus claims to reflect a move to stronger standards. NESA's aim is to encourage students to show off their deep knowledge, conceptual understanding and problem solving and analytical skills.
- School based assessment practices will change from 2018.
- There will be mandated components and weightings for tasks in both Years 11 and 12.
- The number of school based assessment tasks in Year 11 will be capped at three per subject studied, and in Year 12 it will be four. There will continue to be external assessments such as the formal HSC assessments.

THE NEW HSC: SCIENCE

- The pattern and pathways of study requirements for Stage 6 Science courses have been amended.
- From 2018 students will continue to be able to study six units of Science in Year 11 and for the 2019 HSC exam students can study up to seven units of Science in Year 12. This change allows for the study of Science Extension - a new one unit Year 12 course which will be examined for the first time as part of the 2019 HSC.
- Students may study one of, or any combination of, the following Stage 6 Science courses:
 - Biology
 - Chemistry
 - Earth and Environmental Science
 - Investigating Science
 - Physics
 - Science Extension (Year 12 only)
- The Stage 6 Science courses including the Investigating Science course may provide entry into the new Science Extension (Year 12) course which has been developed to engage high-achieving students and better prepare them for university and careers in STEM.

Biology



- 120 hours in Year 11 and 120 hours in Year 12.
- Working Scientifically skills are embedded.
- 15 hour depth study in Year 11 and 15 hour depth study in Year 12.
- Explores the application of Biology and its significance in finding solutions to health and sustainability issues in a changing world.
- Students are encouraged to solve problems and apply knowledge of biological interactions that relate to a variety of fields.
- The course provides the foundation knowledge and skills required to study biology after completing school, and supports participation in a range of careers in biology and related interdisciplinary industries.
- Promotes an appreciation for the diversity of life on the Earth and its habitats.

Chemistry



- 120 hours in Year 11 and 120 hours in Year 12.
- Working Scientifically skills are embedded.
- 15 hour depth study in Year 11 and 15 hour depth study in Year 12.
- Explores the structure, composition and reactions of and between all elements, compounds and mixtures that exist in the Universe.
- The discovery and synthesis of new compounds, the monitoring of elements and compounds in the environment, and an understanding of industrial processes and their applications to life processes are central to human progress and our ability to develop future industries and sustainability.
- It requires students to use their imagination to visualise the dynamic, minuscule world of atoms in order to gain a better understanding of how chemicals interact.
- The course provides the foundation knowledge and skills required to study chemistry after completing school, and supports participation in a range of careers in chemistry and related interdisciplinary industries.
- 2 unit mathematics or higher required.

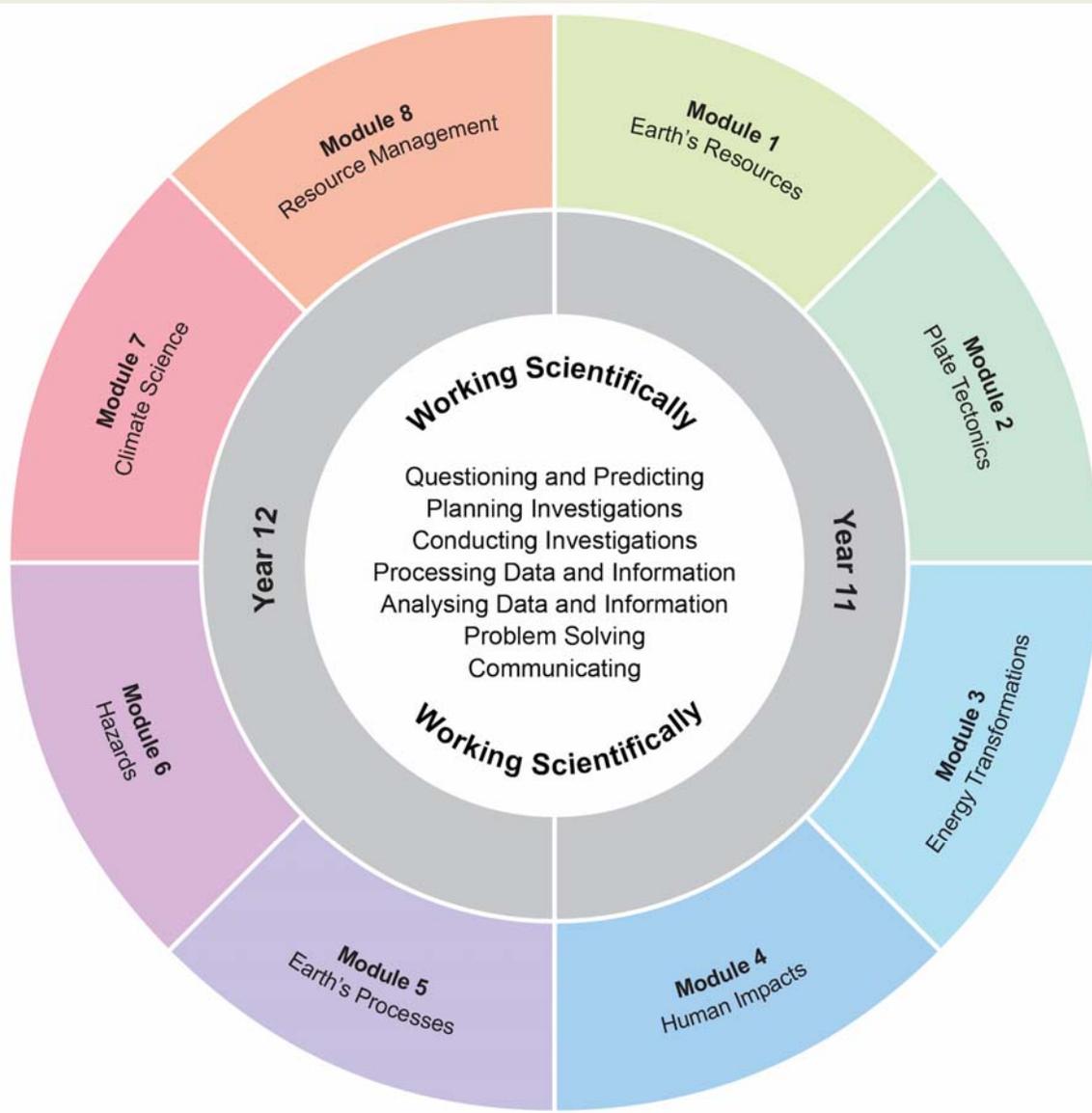
Earth and Environmental Science



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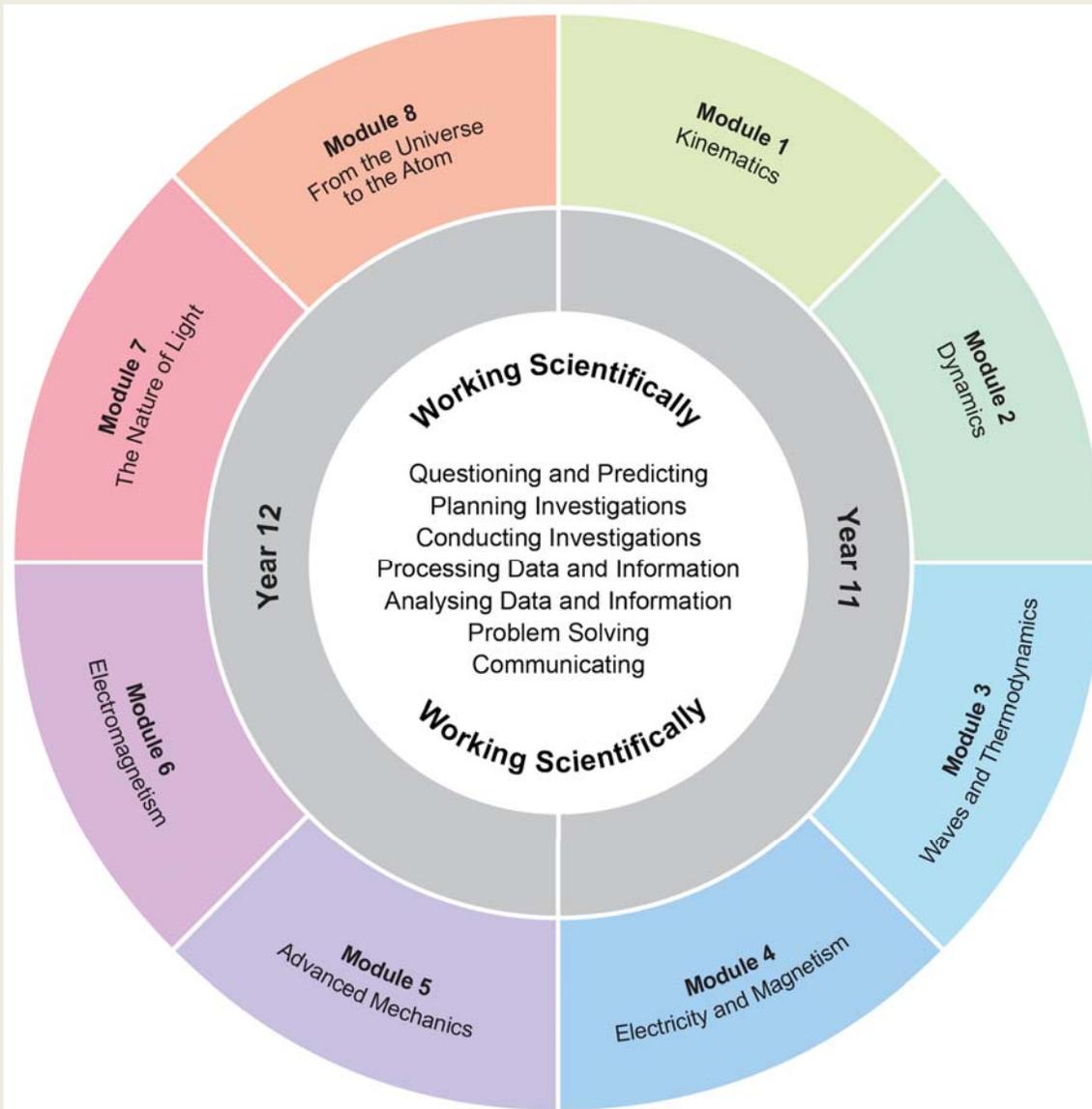
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- 120 hours in Year 11 and 120 hours in Year 12.
- Working Scientifically skills are embedded.
- 15 hour depth study in Year 11 and 15 hour depth study in Year 12.
- Explores the Earth's renewable and non-renewable resources and also environmental issues.
- An understanding of the Earth's resources and the ability to live sustainably on the planet is a central purpose of the study of Earth and Environmental Science.
- Provides the foundation knowledge and skills required to study earth and environmental science after completing school, and supports participation in careers in a range of related industries.
- The application of earth and environmental science is essential in addressing current and future environmental issues and challenges. It is also necessary for the use and management of geological resources that are important to Australia's sustainable future.

[Image Source: NSW Education Standards Authority Syllabuses](#)

Physics



- 120 hours in Year 11 and 120 hours in Year 12.
- Working Scientifically skills are embedded.
- 15 hour depth study in Year 11 and 15 hour depth study in Year 12.
- Physics deals with the study of phenomena on scales of space and time – from nuclear particles and their interactions up to the size and age of the Universe.
- Students who study physics are encouraged to use observations to develop quantitative models of real world problems and derive relationships between variables. They are required to engage in solving equations based on these models, make predictions, and analyse the interconnectedness of physical entities.
- The study of physics provides the foundation knowledge and skills required to support participation in a range of careers. It is a discipline that utilises innovative and creative thinking to address new challenges, such as sustainability, energy efficiency and the creation of new materials.
- 2 unit mathematics or higher required.

Physics



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“The new syllabus is certainly a return to more traditional content. It is explicitly more mathematical, with 82 equations compared with the current 40, with mandated derivations.

There is also a return to the fundamental physics of thermodynamics and optics. (You might make a quick buck investing in calorimeters and diffraction gratings, which were all thrown out of schools years ago.) Also, particle physics is mandatory rather than being optional (but alas, no simple harmonic motion as mooted in the prior draft syllabus, which is a shame, because I love it!).

Conversely, there is the loss of the much-decried social and historical contexts of the current syllabus. It should be noted, however, that the Science Teachers' Association of NSW raised concerns that this could potentially lead to a loss of narrative from new teachers who are unaware of the historical linkages and societal implications.

The biggest difference will be in the nature of exam questions, slated for introduction in 2019. In contrast to recent questions such as: “Assess the impact of the use of transistors on society” (HSC 2012, Q25), a 5-mark essay-style question, students will most likely face questions like: “Derive the expression $v = \sqrt{2GM/r}$ for escape velocity”.

- Crook, S. (2017, February 22nd) [New physics syllabus raises the bar, but how will schools clear it?](http://theconversation.com) *The Conversation*. Retrieved from <http://theconversation.com>

Investigating Science



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- 120 hours in Year 11 and 120 hours in Year 12.
- Working Scientifically skills are embedded.
- 30 hour depth study in Year 11 and 30 hour depth study in Year 12.
- It is designed to assist students of all abilities engage with scientific processes, and apply those processes to investigate relevant personal, community and global scientific issues.
- The course promotes active inquiry and explores key concepts, models and phenomena.
- Investigating Science encourages the development of a range of capabilities and capacities that enhance a student's ability to participate in all aspects of community life and within a fast-changing technological landscape.

[Image Source: NSW Education Standards Authority Syllabuses](#)

Course Description

- The Science Extension course is designed to extend the knowledge, understanding and skills developed in the new 2-unit Science disciplines and provide greater opportunities for students with an aptitude in the STEM disciplines.
- Science Extension is a 1 Unit course studied in Year 12. It is structured to provide opportunities for high achieving students to engage with complex concepts and theories and to critically evaluate new ideas and discoveries through contemporary data collection and scientific research.

Proposed course content

- Students will:
 - investigate the development of current scientific thinking and scientific research methodologies including the statistical analysis of large data sets
 - conduct a professional literature review to determine a research question
 - find patterns and trends in data using statistical analysis to determine evidence that supports or refutes their hypothesis
 - write an authentic Scientific Research Report.
- Consultation on the draft syllabus has now closed and the finalised syllabus should be available later in 2017, ready for implementation in Term 4, 2018.

Main Topics and Assessment Covered

		Modules	Indicative hours	Research Report	Proposed School-Based Assessment
<p>Year 12 course (120 hours)</p>	<p>Working Scientifically Skills</p>	<p>Module 1 The Foundations of Scientific Thinking</p>	<p>20</p>	<p>Establish an area for scientific research ↓ Formulate the question for research</p>	<ul style="list-style-type: none"> • Maximum 3 assessments in Year 12 • Tasks will have a weighting of between 20% – 40% • One task must be the Scientific Research Report – with a weighting of 40% • One task may be a formal written examination
		<p>Module 2 The Scientific Research Proposal</p>		<p>↓ Find or generate the data. Apply methodologies to analyse the data for the Scientific Research Project</p>	
		<p>Module 3 The Data, Evidence and Decisions</p>	<p>40</p>	<p>↓ Develop the Scientific Research Report and offer solutions to the scientific research question</p>	
		<p>Module 4 The Scientific Research Report</p>			

Depth Study



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What are Depth Studies?

A depth study is any type of investigation/activity that a student completes individually or collaboratively that allows the further development of one or more concepts found within or inspired by the syllabus. It may be one investigation/activity or a series of investigations/activities.

Depth studies provide opportunities for students to pursue their interests in science, acquire a depth of understanding, and take responsibility for their own learning. Depth studies promote differentiation and engagement, and support all forms of assessment, including assessment for, as and of learning. Depth studies allow for the demonstration of a range of Working Scientifically skills.

A depth study may be, but is not limited to:

- a practical investigation or series of practical investigations and/or a secondary-sourced investigation or series of secondary-sourced investigations
- presentations, research assignments or fieldwork reports
- the extension of concepts found within the course, either qualitatively and/or quantitatively.

The length of time for any individual study and the pedagogies employed are not prescribed. The time for the depth studies may be allocated to a single study or spread over the year, and incorporate several studies depending on individual school and/or class requirements.

[Image Source: NSW Education Standards Authority Syllabuses](#)

Depth Study

Ideas for Depth Studies

Practical Investigations

- Design and conduct experiments
- Test a claim
- Test a device.

Secondary-sourced Investigations

- Make a documentary or media report
- Conduct a literature review
- Develop an evidence-based argument
- Write a journal article
- Write an essay – historical or theoretical
- Develop an environmental management plan
- Analyse a work of fiction or film for scientific relevance
- Create a visual presentation
- Investigate emerging technologies.

Creating

- Design and invent
- Create a working model
- Create a portfolio.

Fieldwork

Fieldwork may be a starting point for a practical investigation or secondary-sourced study and could be initiated by the following stimuli:

- an excursion
- engagement with community experts.

Data Analysis

Data analysis may be incorporated into a practical investigation or secondary-sourced investigation. For example:

- construction and analysis of graphs/tables
- data analysis from a variety of sources
- research analysis, eg of longitudinal data, resource management data.



Assessment of Depth Studies must:

- address Questioning and Predicting, and Communicating skills outcomes
- address a minimum of two additional Working Scientifically skills outcomes
- include assessment of at least one Knowledge and Understanding outcome.

Assessment



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	In-school Assessment
Year 11 course (120 hours)	<ul style="list-style-type: none">• The components and weightings of 60% Working Scientifically and 40% Knowledge and Understanding of Course Content are mandatory• Three assessment tasks• The minimum weighting for an individual task is 20%• The maximum weighting for an individual task is 40%• One task may be a formal written examination• One task must focus on a depth study or an aspect of a depth study with a weighting of 20–40%
Year 12 course (120 hours)	<ul style="list-style-type: none">• A maximum of four assessment tasks• The minimum weighting for an individual task is 10%• The maximum weighting for an individual task is 40%• One task may be a formal written examination with a maximum weighting of 30%• One task must focus on a depth study or an aspect of a depth study with a weighting of 20–40%

- The new exam specifications will be released in Term 3 along with a consultation report for each of the four subject areas, and support materials such as:
 - sample examination questions and answers
 - sample marking guidelines
 - revised performance band descriptions.

Further Questions



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