

**B O A R D O F S T U D I E S**  
NEW SOUTH WALES

# **Design and Technology**

## **Stage 6**

## **Syllabus**

**PLEASE NOTE**

The assessment and HSC examination requirements detailed in this syllabus refer to the 2009 HSC. *New Assessment and Reporting* information will apply to this syllabus for the 2010 HSC and beyond.

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# 1 The Higher School Certificate Program of Study

The purpose of the Higher School Certificate program of study is to:

- provide a curriculum structure which encourages students to complete secondary education;
- foster the intellectual, social and moral development of students, in particular developing their:
  - knowledge, skills, understanding and attitudes in the fields of study they choose
  - capacity to manage their own learning
  - desire to continue learning in formal or informal settings after school
  - capacity to work collaboratively
  - respect for the cultural diversity of Australian society;
- provide a flexible structure within which students can prepare for:
  - further education and training
  - employment
  - full and active participation as citizens;
- provide formal assessment and certification of students' achievements;
- provide a context within which schools also have the opportunity to foster student's physical and spiritual development.

## **2 Rationale for Design and Technology in the Stage 6 Curriculum**

From the earliest times, humans have interpreted, shaped and altered their environments in an attempt to improve the quality of their lives. In the process, technologies have evolved and been developed to the extent that, today, they have an impact on most aspects of our daily lives.

Australia needs business, industry and community leaders who understand the nature of design and technology; who will foster and promote innovation and the creative use of technologies; and who appreciate how design and technological activity contribute to the lives of individuals and to cultures and environments.

The issue of sustainable development is of concern to individuals, communities and governments as increasing evidence of the depletion of our natural resources through technological activity emerges.

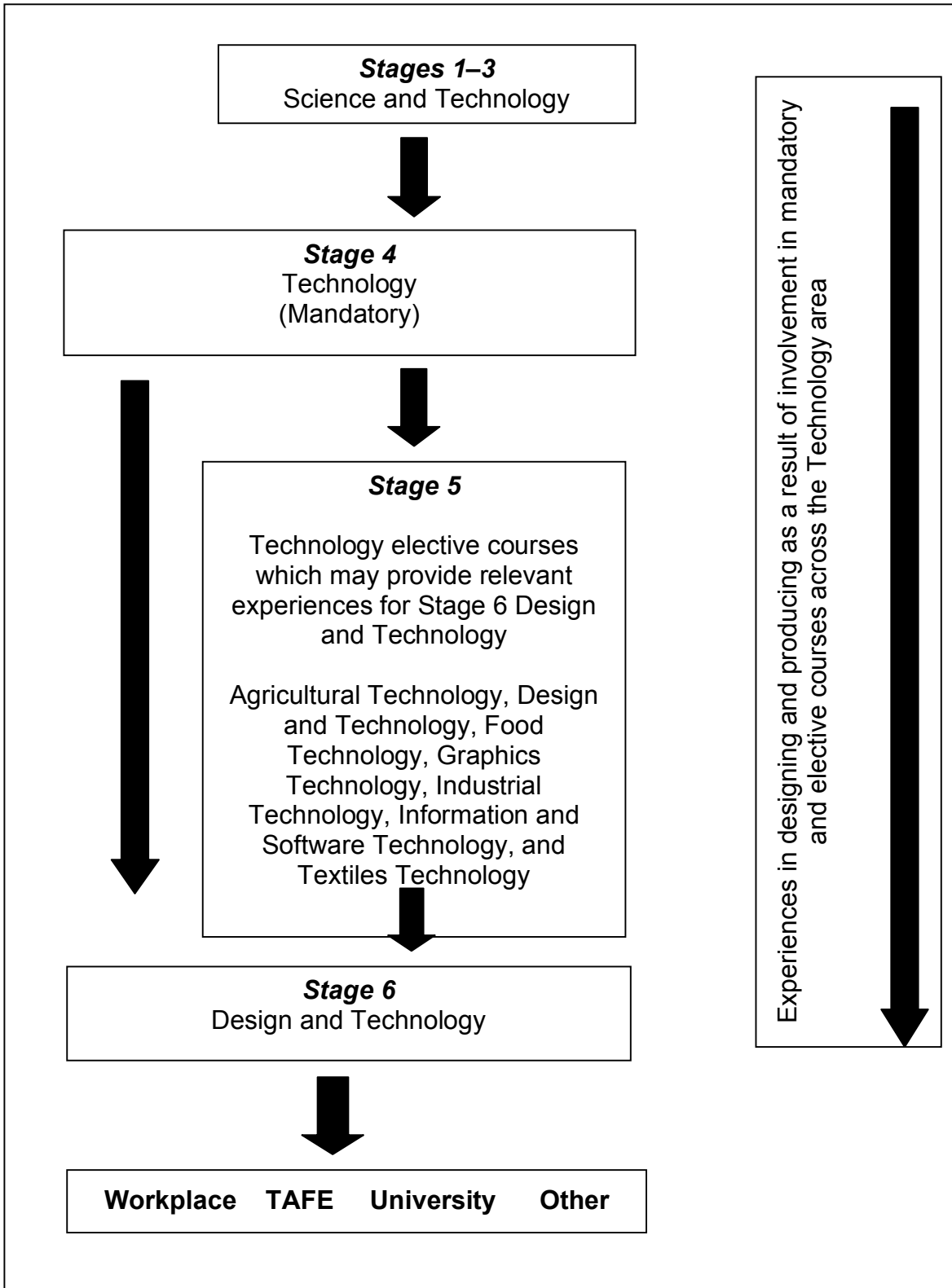
The study of Design and Technology Stage 6 develops conceptual understanding and enables students to creatively apply these to specific technological endeavours through design projects. It also seeks to develop students' appreciation of the historical and cultural influences on design and the interrelationships of design, technology, society and the environment.

Design and Technology has a unique focus on creativity, innovation and the successful implementation of innovative ideas. Students will investigate the importance of evaluation, the role of computer-based technologies, management, communication and collaborative design, as well as exploring current and emerging technologies. Through the completion of quality design projects, students are provided with the opportunity to develop specific production and manufacturing skills.

Design and Technology is inclusive of the needs, interests and aspirations of all students. It provides opportunities for students to develop design projects in areas of individual interest, to discuss equity issues related to design, production and manufacturing in the Australian society and to consider careers in the fields of design and manufacturing.

Students will be given the opportunity to explore and develop technologies and demonstrate insight into the future uses of technology. They will articulate arguments on issues and consequences including environmental and social impacts. They will develop skills that are transferable and which lead to lifelong learning.

### 3 Continuum of Learning for Design and Technology Stage 6 Students



## **4 Aim**

Design and Technology Stage 6 is designed to develop students' confidence, competence and responsibility in designing, producing and evaluating to meet both needs and opportunities, and to understand the factors that contribute to successful design and production.

## **5 Objectives**

Students will develop:

1. knowledge and understanding about design theory and design processes in a range of contexts;
2. knowledge, understanding and appreciation of the interrelationship of design, technology, society and the environment;
3. creativity and an understanding of innovation and entrepreneurial activity in a range of contexts;
4. skills in the application of design processes to design, produce and evaluate quality design projects that satisfy identified needs and opportunities;
5. skills in research, communication and management in design and production;
6. knowledge and understanding about current and emerging technologies in a variety of settings.

## 6 Course Structure

<b>Preliminary Course</b> <b>120 indicative hours</b>	<b>HSC Course</b> <b>120 indicative hours</b>
<p><i>Each of the content areas should be introduced and given appropriate emphasis through teaching and learning activities and a minimum of two design projects.</i></p> <p><b>Designing and Producing</b></p> <p>The study of:</p> <ul style="list-style-type: none"> <li>• design theory and practice</li> <li>• design processes</li> <li>• factors affecting designing and producing</li> <li>• design and production processes in domestic, community, industrial and commercial settings</li> <li>• technologies in industrial and commercial settings</li> <li>• environmental and social issues</li> <li>• creative approaches to design</li> <li>• collaborative approaches to design</li> <li>• project analysis</li> <li>• marketing and market research</li> <li>• techniques, materials, tools and other resources</li> <li>• the realisation of ideas through the manipulation of techniques, materials tools and other resources</li> <li>• occupational, health and safety</li> <li>• evaluation</li> <li>• project management</li> <li>• factors affecting management</li> <li>• communication</li> <li>• research methods</li> <li>• interpreting and presenting data</li> <li>• ethics in research</li> <li>• manufacturing and production</li> <li>• computer-based technologies.</li> </ul> <p>As part of this study, students will complete a minimum of two design projects.</p>	<p><i>Each of the content areas are addressed through the major design project, case study and through other teaching and learning activities.</i></p> <p><b>Innovation and Emerging Technologies</b></p> <p>The study of:</p> <ul style="list-style-type: none"> <li>• designs and design practice</li> <li>• factors which may impact on successful innovation</li> <li>• entrepreneurial activity</li> <li>• the impact of emerging technologies</li> <li>• the impact on Australian society</li> <li>• historical and cultural influences</li> <li>• ethical and environmental issues</li> <li>• creativity.</li> </ul> <p>As part of this study, students will complete a case study of an innovation which includes reference to the above factors.</p> <p><b>Designing and Producing</b></p> <p>The study of:</p> <ul style="list-style-type: none"> <li>• <b>Project proposal and project management</b> <ul style="list-style-type: none"> <li>– identification and exploration of the need</li> <li>– areas of investigation</li> <li>– criteria to evaluate success</li> <li>– action, time and finance plans</li> </ul> </li> <li>• <b>Project development and realisation</b> <ul style="list-style-type: none"> <li>– design theory and practice</li> <li>– creativity</li> <li>– research</li> <li>– development and evaluation of ideas</li> <li>– study of practices in industrial and commercial settings</li> <li>– production techniques</li> <li>– communication</li> <li>– safe working practices</li> <li>– selection and use of resources</li> </ul> </li> <li>• <b>Project evaluation</b> <ul style="list-style-type: none"> <li>– criteria for evaluation</li> <li>– analysis of evaluation</li> <li>– impact of the major design project on the individual, society and the environment.</li> </ul> </li> </ul> <p>As part of this study, students will complete a major design project.</p>

## **Preliminary Course Structure**

The Preliminary course is 120 indicative hours and will involve a minimum of two design projects. The projects will develop skills and knowledge to be further developed in the HSC course. Each project will place emphasis on the development of different skills and knowledge in designing and producing.

Students must participate in hands-on, practical activities to achieve the outcomes of this course. Class activities should be designed to develop knowledge and skills in designing and producing. Students should develop their knowledge of the activities within industrial and commercial settings which support design and technology and relate these processes to the processes used in their own designing and producing.

Design projects must involve the design, production and evaluation of a product, system or environment that includes evidence of design processes recorded in a design folio, which may be in a variety of different forms. Students should be encouraged to communicate their design ideas using a range of appropriate media.

## **HSC Course Structure**

The HSC course is 120 indicative hours and includes the development and realisation of the major design project, a case study of an innovation and other teaching and learning activities. The comprehensive study of design and the processes of designing and producing that were studied in the Preliminary course are synthesised and applied.

The major design project involves students selecting and applying appropriate design, production and evaluation skills to a product, system or environment which satisfies an identified need or opportunity. Students have developed a wide range of skills and knowledge in the Preliminary course and in the HSC course are able to select and use those skills and knowledge appropriate to their selected project. The students relate the techniques and technologies used in industrial and commercial settings to those used in the development of design projects.

The case study involves the critical analysis of an innovation. By conducting a detailed case study of an innovation, students will be able to identify the factors underlying the success of the innovation; analyse ethical issues in relation to the innovation; and discuss the impact of the innovation on Australian society. They may also be able to apply processes similarly in the exploration and development of the major design project.

## 7 Objectives and Outcomes

### 7.1 Table of Objectives and Outcomes

Objectives	Preliminary Outcomes	HSC Outcomes
Students will develop:	A student:	A student:
1. knowledge and understanding about design theory and design processes in a range of contexts	P1.1 examines design theory and practice, and considers the factors affecting designing and producing in design projects	H1.1 critically analyses the factors affecting design and the development and success of design projects  H1.2 relates the practices and processes of designers and producers to the major design project
2. knowledge, understanding and appreciation of the interrelationship of design, technology, society and the environment	P2.1 identifies design and production processes in domestic, community, industrial and commercial settings  P2.2 explains the impact of a range of design and technology activities on the individual, society and the environment through the development of projects	H2.1 explains the influence of trends in society on design and production  H2.2 evaluates the impact of design and innovation on society and the environment
3. creativity and an understanding of innovation and entrepreneurial activity in a range of contexts	P3.1 investigates and experiments with techniques in creative and collaborative approaches in designing and producing	H3.1 analyses the factors that influence innovation and the success of innovation  H3.2 uses creative and innovative approaches in designing and producing
4. skills in the application of design processes to design, produce and evaluate quality design projects that satisfy identified needs and opportunities	P4.1 uses design processes in the development and production of design solutions to meet identified needs and opportunities  P4.2 uses resources effectively and safely in the development and production of design solutions  P4.3 evaluates the processes and outcomes of designing and producing	H4.1 identifies a need or opportunity and researches and explores ideas for design development and production of the major design project  H4.2 selects and uses resources responsibly and safely to realise a quality major design project  H4.3 evaluates the processes undertaken and the impacts of the major design project

5. skills in research, communication and management in design and production	<p>P5.1 uses a variety of management techniques and tools to develop design projects</p> <p>P5.2 communicates ideas and solutions using a range of techniques</p> <p>P5.3 uses a variety of research methods to inform the development and modification of design ideas</p>	<p>H5.1 manages the development of a quality major design project</p> <p>H5.2 selects and uses appropriate research methods and communication techniques</p>
6. knowledge and understanding about current and emerging technologies in a variety of settings	<p>P6.1 investigates a range of manufacturing and production processes and relates these to aspects of design projects</p> <p>P6.2 evaluates and uses computer-based technologies in designing and producing</p>	<p>H6.1 justifies technological activities undertaken in the major design project through the study of industrial and commercial practices</p> <p>H6.2 critically assesses the emergence and impact of new technologies, and the factors affecting their development</p>

## 7.2 Key Competencies

Design and Technology Stage 6 provides a context within which to develop general competencies considered essential for the acquisition of effective, higher-order thinking skills necessary for further education, work and everyday life.

Key competencies are embedded in the *Design and Technology Stage 6 Syllabus* to enhance student learning. The key competencies of **collecting, analysing and organising information, communicating ideas and information**, reflect processes of design research and idea development and are explicit in the objectives and outcomes of the syllabus. The other key competencies are developed through the methodologies of the syllabus and through classroom pedagogy. Students work as individuals and as members of groups to conduct investigations and analysis, and through this, the key competencies **planning and organising activities** and **working with others and in teams** are developed. When students develop, modify and construct projects, they are developing the key competency **using mathematical ideas and techniques**. During investigations, students will need to use appropriate information technologies and so develop the key competency of **using technology**. Finally, experimentation with a range of materials, processes and techniques, contributes towards the students' development of the key competency **solving problems**.

## 8 Content: Design and Technology Stage 6 Preliminary Course

Outcomes	Students learn about:	Students learn to:
<p>P1.1 examines design theory and practice, and considers the factors affecting designing and producing in design projects</p>	<ul style="list-style-type: none"> <li>• design theory and practice                             <ul style="list-style-type: none"> <li>– range of design professions</li> <li>– nature and variety of work of a range of design professions</li> <li>– interaction and overlap of design professions</li> <li>– Australian and international designers and their work</li> </ul> </li> <li>• design processes                             <ul style="list-style-type: none"> <li>– design processes used in domestic, community, industrial and commercial settings from initial contact with clients to final presentation</li> </ul> </li> <li>• factors affecting designing and producing including:                             <ul style="list-style-type: none"> <li>– appropriateness of the design solution</li> <li>– needs</li> <li>– function</li> <li>– aesthetics</li> <li>– finance</li> <li>– ergonomics</li> <li>– occupational, health and safety</li> <li>– quality</li> <li>– short-term and long-term environmental consequences</li> <li>– obsolescence</li> <li>– life cycle analysis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• investigate at least one designer and the nature of their work</li> <li>• identify a range of career opportunities in design and production</li> <li>• describe and analyse the processes undertaken when designing</li> <li>• apply a design process when developing design projects</li> <li>• identify factors affecting design                             <ul style="list-style-type: none"> <li>– analyse design products</li> <li>– compare and contrast the factors to be considered in the design and production of design projects</li> <li>– appraise the aesthetic and functional qualities of a variety of design products, systems and/or environments</li> </ul> </li> </ul>
<p>P2.1 identifies design and production processes in domestic, community, industrial and commercial settings</p>	<ul style="list-style-type: none"> <li>• design and production processes in domestic, community, industrial and commercial settings</li> <li>• technologies in industrial and commercial settings</li> </ul>	<ul style="list-style-type: none"> <li>• compare and contrast technologies and processes used in design projects to activities of design and production in industrial and commercial settings</li> </ul>

Design and Technology Stage 6 Syllabus

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<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
P2.2 explains the impact of a range of design and technology activities on the individual, society and the environment through the development of projects	<ul style="list-style-type: none"> <li>• environmental and social issues including:                             <ul style="list-style-type: none"> <li>– personal values</li> <li>– cultural beliefs</li> <li>– sustainability</li> <li>– safety and health</li> <li>– community needs</li> <li>– individual needs</li> <li>– equity</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• assess the impact of the activities undertaken in the development of design projects on the individual, society and the environment</li> <li>• evaluate examples of design and production and relate these to environmental and social issues</li> </ul>
P3.1 investigates and experiments with techniques in creative and collaborative approaches in designing and producing	<ul style="list-style-type: none"> <li>• creative approaches including:                             <ul style="list-style-type: none"> <li>– cognitive organisers</li> <li>– strategies for problem solving and solution creating</li> <li>– ideas generation</li> </ul> </li> <li>• collaborative approaches                             <ul style="list-style-type: none"> <li>– design teams: roles and tasks of members</li> <li>– communication between and within design teams</li> <li>– team responsibilities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• select and apply a variety of cognitive organisers</li> <li>• apply problem solving techniques to identified problems</li> <li>• identify the factors that contribute to successful work and collaboration</li> <li>• collaborate and participate in design teams</li> <li>• work cooperatively</li> </ul>
P4.1 uses design processes in the development and production of design solutions to meet identified needs and opportunities	<ul style="list-style-type: none"> <li>• project analysis                             <ul style="list-style-type: none"> <li>– design briefs</li> <li>– appropriateness of design solutions</li> <li>– criteria for evaluation and factors to consider</li> </ul> </li> <li>• marketing and market research                             <ul style="list-style-type: none"> <li>– purpose of market research</li> <li>– sources of data and information gathering techniques</li> <li>– marketing environment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• formulate and analyse design briefs</li> <li>• identify the parameters of design</li> <li>• identify criteria for success of design projects</li> <li>• produce functionally and aesthetically appropriate design projects</li> <li>• conduct market research to identify needs and opportunities</li> </ul>

Design and Technology Stage 6 Syllabus

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<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
<p>P4.2 uses resources effectively and safely in the development and production of design solutions</p>	<ul style="list-style-type: none"> <li>- using materials, tools, techniques and other resources</li> <li>- characteristics and properties</li> <li>- functions and uses</li> <li>- experimentation</li> <li>- criteria for selection</li> <li>- consequences of use</li> </ul> <ul style="list-style-type: none"> <li>• the realisation of ideas through the manipulation of materials, tools and techniques and other resources</li> <li>• safety                             <ul style="list-style-type: none"> <li>- safety in the use of materials, tools and techniques</li> <li>- legislative requirements including Occupational Health &amp; Safety</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• select appropriate materials, tools, techniques and other resources</li> <li>• justify and explain the selection and use of resources in design projects</li> <li>• develop and demonstrate proficiency in using an appropriate range of materials, tools, techniques and other resources</li> <li>• implement safe work practices when designing and producing</li> </ul>
<p>P4.3 evaluates the processes and outcomes of designing and producing</p>	<ul style="list-style-type: none"> <li>• evaluation                             <ul style="list-style-type: none"> <li>- developing and refining ideas</li> <li>- criteria for evaluation</li> <li>- methods of evaluation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• establish the parameters for design and identify criteria for the evaluation of design projects</li> <li>• examine processes undertaken in design projects</li> <li>• conduct continual evaluation throughout design and production</li> <li>• assess the impact of designing and design projects on society and the environment</li> <li>• test and evaluate the appropriateness of design solutions</li> </ul>

Design and Technology Stage 6 Syllabus

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<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
<p>P5.1 uses a variety of management techniques and tools to develop design projects</p>	<ul style="list-style-type: none"> <li>- project management</li> <li>- management techniques and tools, including those used by designers in industrial and commercial settings</li> <li>• factors affecting management including:                             <ul style="list-style-type: none"> <li>- identifying available resources</li> <li>- clarifying values</li> <li>- setting goals</li> <li>- setting standards</li> <li>- evaluating the costs and benefits of each alternative</li> <li>- making and implementing decisions</li> <li>- task descriptions and sequencing</li> <li>- documentation of plans</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• identify a variety of management techniques and tools</li> <li>• plan, implement and evaluate a sequence of operations for the completion of design projects</li> </ul>
<p>P5.2 communicates ideas and solutions using a range of techniques</p>	<ul style="list-style-type: none"> <li>• communication                             <ul style="list-style-type: none"> <li>- forms of communication including verbal, written, graphical, visual, audio</li> <li>- elements of the communication process which include sender, receiver, medium, message</li> <li>- criteria for evaluating communication including clarity of message, appropriateness of method chosen, ease of interpretation</li> <li>- communicating information through a variety of media</li> <li>- visualising solutions</li> <li>- the purpose of prototypes and/or models</li> <li>- presentation techniques suited to the needs of design clients and design projects</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• use appropriate design and technology terminology</li> <li>• experiment with a range of techniques and forms to visualise and communicate ideas and solutions</li> <li>• communicate design ideas and solutions effectively using a range of technologies</li> <li>• use appropriate standards and conventions to visualise and communicate ideas and solutions</li> <li>• justify the selection and use of communication techniques</li> </ul>

Design and Technology Stage 6 Syllabus

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<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
P5.3 uses a variety of research methods to inform the development and modification of design ideas	<ul style="list-style-type: none"> <li>• research methods                             <ul style="list-style-type: none"> <li>– qualitative and quantitative research</li> <li>– questionnaires</li> <li>– surveys</li> <li>– interviews</li> <li>– observation</li> <li>– tests and experiments</li> <li>– statistical analysis</li> <li>– information research including print and electronic sources</li> </ul> </li> <li>• interpreting and presenting data</li> <li>• ethics in research</li> </ul>	<ul style="list-style-type: none"> <li>• select and use a variety of research methods to inform the generation, modification, and development of design ideas</li> <li>• analyse, interpret and apply research data to the development of design projects</li> </ul>
P6.1 investigates a range of manufacturing and production processes and relates these to aspects of design projects	<ul style="list-style-type: none"> <li>– manufacturing and production</li> <li>– selection of processes appropriate to a need</li> <li>– development of appropriate skills and techniques</li> </ul>	<ul style="list-style-type: none"> <li>• account for practices undertaken in industrial and commercial settings</li> <li>• demonstrate quality production skills in the development of design projects</li> </ul>
P6.2 evaluates and uses computer-based technologies in designing and producing.	<ul style="list-style-type: none"> <li>• computer-based technologies and their application including:                             <ul style="list-style-type: none"> <li>• modelling</li> <li>• research</li> <li>• simulation and graphics</li> <li>• communication</li> <li>• presentation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• discriminate in the choice and use of computer-based technologies to develop, communicate and present design ideas and processes.</li> </ul>

## 9 Content: Design and Technology Stage 6 HSC Course

Outcomes	Students learn about:	Students learn to:
<p>H1.1 critically analyses the factors affecting design and the development and success of design projects</p>	<ul style="list-style-type: none"> <li>• factors affecting designing and producing, including:                             <ul style="list-style-type: none"> <li>– appropriateness of the design solution</li> <li>– needs</li> <li>– function</li> <li>– aesthetics</li> <li>– finance</li> <li>– ergonomics</li> <li>– occupational, health and safety</li> <li>– quality</li> <li>– short-term and long-term environmental consequences</li> <li>– obsolescence</li> <li>– life cycle analysis</li> </ul> </li> <li>• examples of success and failure in design</li> </ul>	<ul style="list-style-type: none"> <li>• apply factors affecting design to the development of the major design project</li> <li>• debate the issues and factors influencing design and design practice</li> <li>• critically analyse examples of success and failure in design solutions</li> </ul>
<p>H1.2 relates the practices and processes of designers and producers to the major design project</p>	<ul style="list-style-type: none"> <li>• the work of designers                             <ul style="list-style-type: none"> <li>– design practice</li> <li>– processes used by designers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• emulate, where appropriate, the practices and processes used by designers to assist in the development of the major design project</li> </ul>
<p>H2.1 explains the influence of trends in society on design and production</p>	<ul style="list-style-type: none"> <li>• trends in designing and producing, including those which are influenced by social, global, political, economic and environmental issues</li> <li>• historical and cultural influences on designing and producing, including:                             <ul style="list-style-type: none"> <li>– changing social trends</li> <li>– cultural diversity</li> <li>– the changing nature of work</li> <li>– technological change</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• discuss the issues arising from trends in design and technological activity</li> <li>• identify and acknowledge historical and cultural influences on design and technological development</li> </ul>

Design and Technology Stage 6 Syllabus

The assessment and HSC examination requirements detailed in this syllabus apply to the 2009 HSC. New *Assessment and Reporting* information will apply to this syllabus for the 2010 HSC and beyond.

<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
H2.2 evaluates the impact of design and innovation on society and the environment	<ul style="list-style-type: none"> <li>• ethical and environmental issues                             <ul style="list-style-type: none"> <li>– ethical and environmental considerations for designers and society</li> <li>– sustainable technologies</li> <li>– protection of intellectual property</li> <li>– rights and responsibilities of the designer</li> <li>– impact on Australian society</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• critically analyse ethical issues in relation to innovation</li> <li>• discuss ethical and environmental considerations for designers and society in general</li> <li>• identify the factors which contribute to the efficiency and sustainability of technologies</li> </ul>
H3.1 analyses the factors that influence innovation and the success of innovation	<ul style="list-style-type: none"> <li>• factors that impact on success of innovation including;                             <ul style="list-style-type: none"> <li>– timing, available and emerging technologies, historical and cultural, political, economic and legal factors, marketing strategies</li> </ul> </li> <li>• the role of a variety of agencies that may impact upon the success of innovation</li> <li>• entrepreneurial activity                             <ul style="list-style-type: none"> <li>– nature of entrepreneurial activity</li> <li>– role in design and technological activity</li> <li>– agencies which influence entrepreneurial activity</li> <li>– management and entrepreneurial activity</li> <li>– legal and ethical issues</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• differentiate between factors which have contributed to the success or failure of innovations</li> <li>• describe the role of a variety of agencies that influence the development, implementation and acceptance of innovation</li> <li>• discuss the influence of entrepreneurial activity on successful design and innovation</li> <li>• discuss the legal and ethical issues related to entrepreneurial activities</li> </ul>
H3.2 uses creative and innovative approaches in designing and producing	<ul style="list-style-type: none"> <li>• creativity and innovative design practice                             <ul style="list-style-type: none"> <li>– processes undertaken to develop innovations</li> <li>– success of innovation</li> <li>– adaptation and development of ideas</li> <li>– responding to motivational stimuli</li> <li>– creative thinking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• demonstrate creativity in the development of the major design project</li> <li>• critically analyse successful innovation</li> <li>• discuss concepts of quality, innovation and creativity</li> </ul>

Design and Technology Stage 6 Syllabus

The assessment and HSC examination requirements detailed in this syllabus apply to the 2009 HSC. New *Assessment and Reporting* information will apply to this syllabus for the 2010 HSC and beyond.

<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
H4.1 identifies a need or opportunity and researches and explores ideas for design development and production of the major design project	<ul style="list-style-type: none"> <li>• needs analysis                             <ul style="list-style-type: none"> <li>– researching and developing ideas</li> <li>– identifying opportunities</li> <li>– formulating an individual design proposal</li> </ul> </li> <li>• research and methods of experimentation to generate ideas</li> </ul>	<ul style="list-style-type: none"> <li>• develop a major design project proposal that clearly outlines:                             <ul style="list-style-type: none"> <li>– identification and exploration of the need</li> <li>– areas of investigation</li> <li>– criteria to evaluate success</li> </ul> </li> <li>• respond to the findings of experimentation and research</li> <li>• experiment with materials, tools and technologies when designing</li> </ul>
H4.2 selects and uses resources responsibly and safely to realise a quality major design project	<ul style="list-style-type: none"> <li>• factors to be considered when selecting resources including:                             <ul style="list-style-type: none"> <li>– safety</li> <li>– ethical issues</li> <li>– environmental issues</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• explain the principles underlying safe working practices and environments                             <ul style="list-style-type: none"> <li>– identify, select, use and justify the use of resources based on the results and analysis of research</li> </ul> </li> </ul>
H4.3 evaluates the processes undertaken and the impacts of the major design project	<ul style="list-style-type: none"> <li>• project evaluation                             <ul style="list-style-type: none"> <li>– ongoing evaluation</li> <li>– criteria to evaluate success</li> <li>– analysing criteria for evaluation</li> <li>– implementation of design solutions</li> </ul> </li> <li>• the impact of the major design project                             <ul style="list-style-type: none"> <li>– on the individual</li> <li>– on society</li> <li>– on the environment (local and global)</li> <li>– in relation to potential social or environmental costs or benefits</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• identify functional and aesthetic criteria of the major design project</li> <li>• test possible solutions of the major design project</li> <li>• conduct continual evaluation throughout the design and production of the major design project</li> <li>• evaluate the impact of the major design project on the individual, society and the environment</li> <li>• evaluate the major design project in terms of the identified criteria for success</li> </ul>
H5.1 manages the development of a quality major design project	<ul style="list-style-type: none"> <li>• project management                             <ul style="list-style-type: none"> <li>– including methods of managing action, time and finance appropriate to the nature of individual design projects</li> <li>– documentation procedures for developing management plans</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• formulate management plans, including:                             <ul style="list-style-type: none"> <li>– action</li> <li>– time</li> <li>– finance</li> </ul> </li> <li>• apply and evaluate management plans</li> <li>• manage a quality major design project that successfully meets the identified need</li> </ul>

Design and Technology Stage 6 Syllabus

The assessment and HSC examination requirements detailed in this syllabus apply to the 2009 HSC. New *Assessment and Reporting* information will apply to this syllabus for the 2010 HSC and beyond.

<b>Outcomes</b>	<b>Students learn about:</b>	<b>Students learn to:</b>
H5.2 selects and uses appropriate research methods and communication techniques	<ul style="list-style-type: none"> <li>• research methods                             <ul style="list-style-type: none"> <li>– data collection, analysis, interpretation and application of conclusions</li> </ul> </li>   <li>• communication                             <ul style="list-style-type: none"> <li>– presenting information</li> <li>– visualising solutions</li> <li>– communication and presentation methods appropriate to the target market</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• conduct research to examine the success of an innovation and produce an investigative report</li>   <li>• select and apply appropriate research methods for the major design project and case study</li>   <li>• justify decisions made based on analysis of research</li>   <li>• select and use appropriate communication techniques for the development of the major design project</li> </ul>
H6.1 justifies technological activities undertaken in the major design project through the study of industrial and commercial practices	<ul style="list-style-type: none"> <li>• practices in industrial and commercial settings as they relate to the major design project including;                             <ul style="list-style-type: none"> <li>– safe work practices using selected resources</li> <li>– production techniques</li> <li>– selection of processes appropriate to an identified need or opportunity</li> <li>– collaborative designing and design teams</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• identify design and production processes used in domestic, community, industrial and commercial settings</li>   <li>• implement safe work practices using selected materials and techniques in design and production of the major design project</li>   <li>• explain the principles underlying safe working practices and environments</li> </ul>
H6.2 critically assesses the emergence and impact of new technologies, and the factors affecting their development.	<ul style="list-style-type: none"> <li>• emerging technologies                             <ul style="list-style-type: none"> <li>– factors affecting their development</li> <li>– criteria for evaluation</li> <li>– impact on society and the environment</li> <li>– impact on innovation.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• appraise the ecological, economic, social, ethical, and legal implications of new and emerging technologies</li>   <li>• analyse the impact of emerging technologies on innovation.</li> </ul>

## **10 Course Requirements**

The *Design and Technology Stage 6 Syllabus* includes a Preliminary course of 120 hours (indicative time) and an HSC course of 120 hours (indicative time).

There is no prerequisite study for the Preliminary course. Completion of the Preliminary course is a requisite for the study of the HSC course.

## 11 Post-school Opportunities

The study of Design and Technology Stage 6 provides students with knowledge, understanding and skills that form a valuable foundation for a range of courses at university and other tertiary institutions.

In addition, the study of Design and Technology Stage 6 assists students to prepare for employment and full and active participation as citizens. In particular, there are opportunities for students to gain recognition in vocational education and training. Teachers and students should be aware of these opportunities.

### Recognition of Student Achievement in Vocational Education and Training (VET)

Wherever appropriate, the skills and knowledge acquired by students in their study of HSC courses should be recognised by industry and training organisations. Recognition of student achievement means that students who have satisfactorily completed HSC courses will not be required to repeat their learning in courses in TAFE NSW or other Registered Training Organisations (RTOs).

Registered Training Organisations, such as TAFE NSW, provide industry training and issue qualifications within the Australian Qualifications Framework (AQF).

The degree of recognition available to students in each subject is based on the similarity of outcomes between HSC courses and industry training packages endorsed within the AQF. Training packages are documents that link an industry's competency standards to AQF qualifications. More information about industry training packages can be found on the National Training Information Service (NTIS) website ([www.ntis.gov.au](http://www.ntis.gov.au)).

#### Recognition by TAFE NSW

TAFE NSW conducts courses in a wide range of industry areas, as outlined each year in the *TAFE NSW Handbook*. Under current arrangements, the recognition available to students of Design and Technology in relevant courses conducted by TAFE is described in the *HSC/TAFE Credit Transfer Guide*. This guide is produced by the Board of Studies and TAFE NSW and is distributed annually to all schools and colleges. Teachers should refer to this guide and be aware of the recognition available to their students through the study of Design and Technology Stage 6. This information can be found on the TAFE NSW website ([www.tafensw.edu.au/mchoice](http://www.tafensw.edu.au/mchoice)).

#### Recognition by other Registered Training Organisations

Students may also negotiate recognition into a training package qualification with another Registered Training Organisation. Each student will need to provide the RTO with evidence of satisfactory achievement in Design and Technology Stage 6 so that the degree of recognition available can be determined.

## 12 Assessment and Reporting

### PLEASE NOTE

The assessment and HSC examination requirements detailed in this syllabus refer to the 2009 HSC. New *Assessment and Reporting* information will apply to this syllabus for the 2010 HSC and beyond.

### 12.1 Requirements and Advice

The information in this section of the syllabus relates to the Board of Studies requirements for assessing and reporting achievement in the Preliminary and HSC courses for the Higher School Certificate.

*Assessment* is the process of gathering information and making judgements about student achievement for a variety of purposes.

In the Preliminary and HSC courses those purposes include:

- assisting student learning
- evaluating and improving teaching and learning programs
- providing evidence of satisfactory achievement and completion in the Preliminary course
- providing the Higher School Certificate results.

*Reporting* refers to the Higher School Certificate documents received by students that are used by the Board to report both the internal and external measures of achievement.

NSW Higher School Certificate results will be based on:

- **an assessment mark** submitted by the school and produced in accordance with the Board's requirements for the internal assessment program
- **an examination mark** derived from the HSC external examinations.

Results will be reported using a course report containing a performance scale with bands describing standards of achievement in the course.

The use of both internal assessment and external examinations of student achievement allows measures and observations to be made at several points and in different ways throughout the HSC course. Taken together, the external examinations and internal assessment marks provide a valid and reliable assessment of the achievement of the knowledge, understanding and skills described for each course.

### Standards Referencing and the HSC Examination

The Board of Studies will adopt a standards-referenced approach to assessing and reporting student achievement in the Higher School Certificate examination.

The standards in the HSC are:

- the knowledge, skills and understanding expected to be learned by students – the *syllabus standards*
- the levels of achievement of the knowledge, skills and understanding – the *performance standards*.

Both *syllabus standards* and *performance standards* are based on the aims, objectives, outcomes and content of a course. Together they specify what is to be learned and how well it is to be achieved.

Teacher understanding of standards comes from the set of aims, objectives, outcomes and content in each syllabus together with:

- the performance descriptions that summarise the different levels of performance of the course outcomes
- HSC examination papers and marking guidelines
- samples of students' achievement on assessment and examination tasks.

## 12.2 Internal Assessment

The internal assessment mark submitted by the school will provide a summation of each student's achievements measured at points throughout the course. It should reflect the rank order of students and relative differences between students' achievements.

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone.

The assessment components, weightings and task requirements to be applied to internal assessment are identified on page 28. They ensure a common focus for internal assessment in the course across schools, while allowing for flexibility in the design of tasks. A variety of tasks should be used to give students the opportunity to demonstrate outcomes in different ways and to improve the validity and reliability of the assessment.

## 12.3 External Examination

In Design and Technology Stage 6 the external examinations include a written paper and major design project for external marking. The specifications for the examination in Design and Technology Stage 6 are on page 29.

The external examination provides a measure of student achievement in a range of syllabus outcomes that can be reliably measured in an examination setting.

The external examination and its marking and reporting will relate to syllabus standards by:

- providing clear links to syllabus outcomes
- enabling students to demonstrate the levels of achievement outlined in the course performance scale
- applying marking guidelines based on established criteria.

## **12.4 Board Requirements for the Internal Assessment Mark In Board Developed Courses**

For each course the Board requires schools to submit an assessment mark for each candidate.

The collection of information for the HSC internal assessment mark must not begin prior to the completion of the Preliminary course.

The Board requires that the assessment tasks used to determine the internal assessment mark must comply with the components, weightings and types of tasks specified in the table on page 28.

Schools are required to develop an internal assessment program which:

- specifies the various assessment tasks and the weightings allocated to each task
- provides a schedule of the tasks designed for the whole course.

The school must also develop and implement procedures to:

- inform students in writing of the assessment requirements for each course before the commencement of the HSC course
- ensure that students are given adequate written notice of the nature and timing of assessment tasks
- provide meaningful feedback on students' performance in all assessment tasks
- maintain records of marks awarded to each student for all assessment tasks
- address issues relating to illness, misadventure and malpractice in assessment tasks
- address issues relating to late submission and non-completion of assessment tasks
- advise students in writing if they are not meeting the assessment requirements in a course and indicate what is necessary to enable the students to satisfy the requirements
- inform students about their entitlements to school reviews and appeals to the Board
- conduct school reviews of assessments when requested by students
- ensure that students are aware that they can collect their Rank Order Advice at the end of the external examinations at their school.

## 12.5 Assessment Components, Weightings and Tasks

### Preliminary Course

The suggested components, weightings and tasks for the Preliminary course are set out below.

Component	Weighting	Tasks
Knowledge and skills in:  <b>Designing and Producing</b>	50	<p>Tasks may include:</p> <p><b>Design Projects (at least 2)</b></p> <p>Each design project may emphasise aspects associated with designing and producing</p> <p>Examples may include:</p> <ul style="list-style-type: none"> <li>– a response to a given brief which demonstrates creative ideas development</li> <li>– a response to a student generated brief with a specific focus, eg environmental consequences of design</li> <li>– students conducting market research to identify a need or opportunity, then working collaboratively to develop ideas</li> </ul>
	25	<p><b>Presentation of Research</b></p> <p>Examples may include:</p> <ul style="list-style-type: none"> <li>– an investigation of the interrelationship of design disciplines</li> <li>– a detailed examination of the designing and producing activities which support successful design, especially in organisations</li> </ul>
	25	<p><b>Test type tasks</b></p> <p>Example:</p> <ul style="list-style-type: none"> <li>– a response to a hypothetical situation</li> </ul>
<b>Marks</b>	<b>100</b>	

There should be a balance between the assessment of:

- knowledge and understanding outcomes, and course content, and
- skills outcomes and course content.

## HSC Course

The internal assessment mark for Design and Technology Stage 6 is to be based on the HSC course only. Final assessment should be based on a range and balance of assessment instruments.

Component	Weighting	Tasks
Knowledge and skills in:  <b>Innovation and Emerging Technologies</b>	20    20	Tasks must include: <ul style="list-style-type: none"> <li>• a case study of an innovation which addresses:                             <ul style="list-style-type: none"> <li>– knowledge of innovation and emerging technologies</li> <li>– skills in researching and communicating (approximately 1000 words or an equivalent presentation)</li> </ul> </li> </ul> Other suggested tasks may include: <ul style="list-style-type: none"> <li>• HSC examination-type tasks such as a trial examination</li> <li>• class topic test</li> </ul>
<b>Designing and Producing</b>	60	<i>NB: Aspects of the major design project that are used for school-based assessment should not use the HSC exam marking criteria for internal assessment</i> <p>Suggested tasks which relate to the internal assessment of aspects of the major design project may include:</p> <ul style="list-style-type: none"> <li>• an oral presentation on:</li> <li>• the design brief for the major design project</li> <li>• the impact of the major design project on the individual, society and the environment</li> <li>• construction of a management plan for an advertising campaign.</li> </ul> <p>Suggested tasks which do not relate to the internal assessment of aspects of the major design project may include:</p> <ul style="list-style-type: none"> <li>• a report where students account for the processes carried out in industrial and commercial settings in relation to those used in a design project</li> <li>• a research report on the trends that influence design and technological activities</li> <li>• HSC examination-type tasks including a trial examination or class topic test</li> <li>• an investigation into materials utilisation which has led to design developments</li> </ul>
<b>Marks</b>	<b>100</b>	

One task may be used to assess several components. It is suggested that 3–5 tasks are sufficient to assess the HSC course outcomes.

## 12.6 HSC External Examination Specifications

The examination in Design and Technology will consist of a written paper worth 40 marks and a Major Design Project worth 60 marks.

### **Written Paper (40 marks)**

Time allowed: One hour and a half

#### **Section I (10 marks)**

- There will be TEN multiple-choice questions.
- All questions are compulsory.
- All questions are of equal value.
- Questions will be answered on the answer sheet provided.

#### **Section II (15 marks)**

- There will be ONE question made up of a number of short structured response parts.
- The question is compulsory.
- The question will be answered in the space provided on the examination paper.

#### **Section III (15 marks)**

- There will be THREE structured extended response questions.
- All questions are of equal value.
- Students should attempt ONE question.
- The question is to be answered in a separate writing booklet.

Questions in the written examination will be based on Innovation and Emerging Technologies and Designing and Producing, and will provide opportunities for students to make reference to the major design project and the case study.

### **Major Design Project (60 marks)**

Each student must undertake, on an individual basis, a major design project for submission for the Higher School Certificate examination. The major design project includes the practical hands-on activity of carrying the project through to realisation and the documentation, in a folio, of all the steps involved in this process.

The Major design project will include the submission of:

- (i) a folio documenting the project proposal and project management, project development and realisation, and project evaluation
- (ii) a product or a system or an environment.

**Development of the major design project may commence from the beginning of the HSC course.**

Students will be required to submit to the Board of Studies an outline of the project on a date to be notified annually in Term 1 of the HSC course. A form for this purpose will be provided by the Board.

The major design project will be completed and submitted on a date to be notified annually by the Board.

On the day of submission for marking, schools will be required to complete a certificate signed by the principal to verify that all work submitted is the student's own work, completed under the supervision and guidance of the teacher. A form for this purpose will be provided by the Board.

In some circumstances it may be necessary for some aspect of the project to be undertaken by some other person or agency. In such cases, the contribution of the outside agent/organisation must be documented in the design folio. Students will not be given credit for actual work completed by others. Justification for, and of, such work will be recognised in the marking process.

Items included with the major design project must be clearly labelled with the candidate number, centre number and title.

The major design project will be examined by examiners appointed by the Board.

*A brief written record of each student's progress throughout the project must be kept by the teacher. This should not be submitted with the project, but may be requested in exceptional circumstances where the examiners require further information. This record should be retained in the school together with assessment records.*

**Major Design Project Examination Criteria**

<b>Components</b>	<b>Criteria</b>	<b>Weighting</b>
<b>Project Proposal and Project Management</b>	<p>Identification and exploration of the need</p> <p>Areas of investigation</p> <p>Criteria to evaluate success</p> <p>Action, time and finance plans and their application</p>	15
<b>Project Development and Realisation</b>	<p>Evidence of creativity – ideas generation, degree of difference and exploration of existing ideas</p> <p>Consideration of design factors relevant to the major design project</p> <p>Appropriate research and experimentation of materials, tools, techniques and testing of design solutions</p> <p>Application of conclusions</p> <p>Identification and justification of ideas and resources used</p> <p>Use of communication and presentation techniques</p> <p>Evidence and application of practical skills to produce a quality project</p>	35
<b>Evaluation</b>	<p>Record and application of evaluation procedures throughout the design project</p> <p>Analysis and evaluation of functional and aesthetic aspects of design</p> <p>Final evaluation with respect to the project's impact on the individual, society and the environment</p> <p>Relationship of the final product, system or environment to the project proposal</p>	10
<b>Marks</b>		60

**12.7 Summary of Internal and External Assessment**

<b>Internal Assessment</b>	<b>Weighting</b>	<b>External Assessment</b>	<b>Weighting</b>
Innovation and Emerging Technologies <ul style="list-style-type: none"> <li>- including a compulsory case study of a specific innovation</li> <li>- other tasks</li> </ul>	20	Section I – Written Paper  Parts A and B (compulsory sections) <ul style="list-style-type: none"> <li>• Multiple-choice</li> <li>• Structured free response</li> </ul>	25
	20	Part C (Choose one out of three questions) – <ul style="list-style-type: none"> <li>• structured extended free response.</li> </ul>	15
Designing and Producing <ul style="list-style-type: none"> <li>• which may include aspects of the major design project</li> </ul>	60	Section II – Major Design Project	60
	100		100

## **12.8 Reporting Student Performance against Standards**

Student performance in an HSC course will be reported against standards on a course report. The course report includes a performance scale for the course describing levels (bands) of achievement, an HSC mark located on the performance scale, an internal assessment mark and an examination mark. It will also show, graphically, the statewide distribution of examination marks of all students in the course.

Each band on the performance scale (except for band 1) includes descriptions that summarise the attainments typically demonstrated in that band.

The distribution of marks will be determined by students' performances against the standards and not scaled to a predetermined pattern of marks.