Shape of the ACT Board of Senior Secondary Studies Curriculum: Technologies

June 2018

Acknowledgment of the cross-sector working party

A cross-sector working party of eight teachers provided advice on development of courses written under the Technologies framework.

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Purpose

The *Shape of the BSSS Senior Secondary Curriculum: Technologies* provides broad direction on the purpose, structure and organisation of courses written under the Technologies Framework.

It is intended to guide the writing of senior secondary courses for Years 11 and 12. This paper has been prepared following analysis of the ACARA Shape of the Australian Curriculum: Technologies paper, an environmental scan of curriculum across jurisdictions and mapping of BSSS accredited courses for duplication of content.

This paper should be read in conjunction with the BSSS Shape of the ACT Senior secondary Curriculum available at (http://www.bsss.act.edu.au/curriculum).

Background on the Proposal

The BSSS Review of Curriculum in 2015 recommended consolidation of course frameworks where there was an educational rationale for this to occur. A number of courses centred on technology have the design aspect at their core. This design concept provides a strong basis for a common Technologies Framework to be constructed. The Curriculum Assessment Committee and the Board approved the development of a single Technologies Framework.

A cross-sectoral committee considered the development of a new single framework replacing those which currently cover the areas of Design and Graphics, Information Technology, Engineering, and Textiles and Fashion. The group developed a new framework which meets the demands of all of these and similar courses (tertiary, accredited and VET). Considerable work was undertaken in proposing new courses which may be developed under the framework for future study by ACT senior secondary students.

The Framework writing group established a rationale and goals for future focussed, flexible courses which aligned with current BSSS design specifications. Contemporary practices in assessment were considered to develop a task type table.

Design specifications for all BSSS accredited courses

The foundation of a course comprises of four core 1.0 standard units. Core units provide students with the breadth of the subject. Units 1-4 are not sequential. Content descriptions state specific subject-based knowledge, understanding and skills. The point of difference between core units will be defined in the unit description and content descriptions. Units will not be organised by activity, instead, units will be organised around a specific focus, concept or issue.

A negotiated study unit is decided upon by a class, group(s) or individual student in consultation with the teacher and with the principal's approval. This unit may be undertaken after the completion of two standard units.

Content descriptions will be written for each unit. Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that enables students to demonstrate all of the content descriptions. The lens which the teacher uses to demonstrate the content descriptions will be determined by the teacher when developing their program of learning. A program of learning is what a college provides to implement the course for a subject.

Proposal	Rationale For Courses Proposed suite of courses written under the Technologies Framework					
	Data Science	**Design & Emerging Technologies**	**Design & Graphics**	**Digital Technologies**	**Engineering Studies**	**Designed Environments**
classification	A/T/M/V	A/T/M	A/T/M	A/T/M/V	T	A/T/M
VET qualification inclusion	ICT30115	TBA	TBA	ICT30115	TBA	TBA
course rationale	This course focuses on the application of statistics, data analysis and related methods in order to understand and analyse phenomena, and develop solutions to interesting problems in a range of contexts. Since the advent of computers, individuals and organizations increasingly process information digitally. Data processing occurs through the use of tools such as spreadsheets and databases, and progresses to more automated methods as the quantity and complexity of data being analysed increases. Cloud-based technologies have led to increasingly large data sets and big data and machine learning techniques now form the basis of automation in many fields of commerce, science, medicine and technology. Data science is the basis of recommendation algorithms, natural language processing, computer vision, artificial intelligence in games and embedded devices and many other modern scientific applications. Students will model and implement digital solutions, manipulating, visualising and	The design and manufacture of products is the major focus of this course which explores the use of a range of existing and emerging materials and technology. Students learn that design theory, audience response, and design principles are reflected in design. Students apply the design process to address a need. Students learn that materials are the basic ingredients of technology. They explore how a wider range of materials is now available which have further encouraged the development of technology and the design of new products. Students use skills, techniques and methods to plan, construct and produce design creations. Students consider the relationship between design, society and culture. Design and Emerging Technology offers students a range of career pathways in design in fields such as engineering, fashion, furniture, jewellery, textile and ceramics, at both professional and vocational levels	The study of Design and Graphics focusses on exploring the purposeful use of technologies and creative processes to produce design solutions. Students acquire knowledge and develop skills using technologies and other processes appropriately, to design and create graphic solutions. Students will engage with emerging technologies, make connections with industry, and apply industry standards and practices through the development of their projects. Design and Graphics, provides pathways in a range of related fields such as architecture, digital 3D modelling, industrial design, engineering, interior design, graphic design, furniture design, fashion, jewellery, ceramics, textiles, and trade based careers.	This course focuses on computational thinking and the application of the design process to create and develop digital solutions using a variety of digital technologies. Digital Technologies involves students creating new ways of doing things, generating their own ideas and creating digital solutions to problems of individual, community and global interest. They model, analyse and evaluate data, test hypotheses, make decisions based on evidence, and create solutions. Innovative solutions may take the form of a product, prototype, and/or proof of concept that allows for improvement or disruption of existing processes or products. Students may explore a single technology deeply, or may consider many different technologies in pursuit of a solution. Through the study of Digital Technologies, students present, validate, and evaluate their solutions. In doing so, they develop and extend their understanding of designing and programming, including fundamental computer science principles such as algorithm selection and complexity, structuring data for processing and problem-solving.	Engineering Studies focusses on students' utilising an investigative and innovative design process to integrate both the creative and technical requirements of problems into the development of engineered solutions. Students will have the opportunity to research, problem solve, apply lateral thinking, mathematical and scientific principles, analyse and evaluate existing ideas, products, processes and solutions to problems. Students will learn to generate imaginative and creative solutions of their own. They will communicate their ideas within the parameters and requirements of engineering based tasks whilst gaining and applying knowledge of industry standards of design, manufacture and safety. This course prepares students for further study in engineering.	This courses focuses on the fields of architecture, interior design, urban design, landscape and sustainable building design. Students learn about 3D spatial design. They apply problem solving skills in making appropriate design solutions to create attractive and functional spaces such as playgrounds, buildings and galleries. This course considers sustainability, aesthetics, human interaction, ergonomics, the ethical use of space and functionality. A course of study in Environmental Design forms a pathway for further study in building design, civil engineering, and architecture, interior design, set design and landscape design, concepts design and furniture design.

	presenting data to influence decision making. Understanding both the power of these analytical techniques and the risks, challenges and ethical dilemmas they present, provides students with a solid foundation for further study, research and employment in a broad range of industries.			Throughout the course, students are exposed to a range of strategies for managing projects and communicating their ideas from ideation to development and launch. Understanding the value of collaboration with others and the importance of stakeholder input in the design of a product is a critical part of developing any solution, including the selection of appropriate technologies and platforms. This course serves as a basis for further education and employment in the IT industry in a range of fields including programming, web development, robotics and games development.		

DRAFT PROPOSED UNIT TITLES

Draft Proposal	Data Science	Design & Emerging Technologies	Design & Graphics	Digital Technologies	Engineering Studies	Designed Environments
Unit 1	Data Representation & Analysis	Design Processes	Design Applications	Digital Assets and Skills	Structural Engineering	Architecture
Unit 2	Big Data Analysis and Techniques	Product Design	Design for Clients	Programming and Platforms	Mechanical Engineering	Landscape Architecture
Unit 3	Machine Learning	Design for Manufacturing	Graphic Communication	Digital Solutions	Applied Engineering	Interior Design
Unit 4	Data Research Project	Innovation and Design	Design for Screen & Media	Structured Project	Engineering Systems	Town Planning / Urban Design
Negotiated Unit	A negotiated study unit is decided upon by a class, group(s) or individual student in consultation with the teacher and with the Principal's approval. The program of learning for a negotiated study unit must meet all the content descriptions as appears in the unit.					

Note: VET qualifications will be explored when courses are developed.

	Proposed suite of courses written under the Technologies Framework (Continued)			
	Fashion & Textiles	**Networking and Security**	**Robotics & Mechatronics**	**Technologies**
classification	A/T/M/V	A/T/M/V	A/T/M/V	A/T/M
VET qualification	Cert 2 MST20616 or equivalent	ICT30115	ICT30115	N/A
course rationale	This course focuses on design thinking and the application of the design process to create and develop practical solutions using textiles as a medium. Students learn about the fashion and textile industry by exploring; fundamentals of design, emerging technologies, fashion futures, history and culture, sustainability and ethics. Students apply problem solving skills in making appropriate design solutions. A course of study in Fashion can establish a basis for further education and employment in the design fields such as interior personal styling, fashion design, industrial design, costume design, production manufacture and textile technologies.	This course focuses on network technologies and architecture, and the devices, media and services and operations in different types of networks. The rise of mobile computing and ubiquitous internet access has led to modern computing systems and platforms that are designed for access anywhere, anytime. These platforms all rely on networks that are not only stable and reliable, but interconnected and increasingly distributed. Understanding networks and the security implications of data transmission through networks is a critical part of developing digital solutions for a wide audience. Students learn how networks facilitate device to device communication through an exploration of core networking technologies and their configuration. This could include the study of embedded systems (Internet of Things devices) alongside core networking devices such as routers and switches and the software that manages them. The security of data and the implications of networked systems for data privacy are considered from many perspectives, including the technical implementation of secure protocols and the ethical challenges associated with providing encrypted communications and storage for all users. Roles in industry where knowledge of networking is valued vary from system and network administrators through to site reliability engineers and cloud infrastructure developers that maintain complicated, distributed software and networks.	This course explores automation and physical computing through the engineering disciplines of robotics and mechatronics. The course introduces fundamental principles of both electronics and mechatronics before investigating microcontrollers that can be programmed to drive electrical circuits and mechanical systems. Students apply their knowledge to the design and construction of real systems, examining how these solutions address problems, needs and challenges faced by individuals and societies. They design and program control software for autonomous and manual interfaces, correcting for noise and unexpected variations in data inputs and processing. Robotics and Mechatronics aims to build theoretical and practical knowledge to prepare students for technical pathways such as engineering, IT, electronics and science.	This course makes provision to draw units from Courses written under this Framework to form a Course.

DRAFT PROPOSED UNIT TITLES

Draft Proposal	Robotics and Mechatronics	Technologies
Unit 1	Building & Programming Circuits	A combination of units from courses written under the Technologies Framework to contribute to a Minor, Major or Double Major of study.
Unit 2	Digital & Analog Interactions	
Unit 3	Robotics & Mechatronic Systems	
Unit 4	Applications of Robotics	
Negotiated Unit	A negotiated study unit is decided upon by a class, group(s) or individual student in consultation with the teacher and with the Principal's approval. The program of learning for a negotiated study unit must meet all the content descriptions as appears in the unit.	

DRAFT PROPOSED UNIT TITLES

Draft Proposal	Fashion & Textiles	Networking and Security	Courses to be written under Industry and Client Services Framework		
			Timber Products TBA	Metal Products TBA	Digital Products TBA
Unit 1	Design Aesthetics	Networking Technologies			Desktop Applications
Unit 2	Design for Purpose	Network Design and Security			Digital Media Foundations
Unit 3	Design for Futures	Scaling Network Architecture			Managing Data and Clients
Unit 4	Design Communication	Distributed and Cloud Computing			Information Technology Workplace Practices
Negotiated Unit	A negotiated study unit is decided upon by a class, group(s) or individual student in consultation with the teacher and with the Principal's approval. The program of learning for a negotiated study unit must meet all the content descriptions as appears in the unit.		**Negotiated Unit**	**Negotiated Unit**	**Negotiated Unit**

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