Automated Autos:

The Future of Driverless Driving and Drones

This event can be incorporated into classroom learning across a range of subjects and it provides an opportunity for authentic STEM inquiry on real-world issues. Relevant links to the Australian Curriculum, Senior Syllabus and Curriculum into the Classroom units are provided below.

The Queensland Museum acknowledges the support of the Department of Education and Training in developing these curriculums links.

Australian Curriculum: Cross-curriculum priorities

Sustainability

- OI.6 The sustainability of ecological, social and economic systems is achieved through informed individual and community action that values local and global equity and fairness across generations into the future.
- OI.7 Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.
- OI.8 Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgements based on projected future economic, social and environmental impacts.

Australian Curriculum: General capabilities

Literacy

***Comprehending* texts through listening, reading and viewing**

Listen and respond to learning area texts - listen to a range of extended spoken and audio texts, including audio-visual texts, and respond to, interpret and evaluate ideas, information and opinions

***Grammar* knowledge**

Express opinion and point of view - use language that indirectly expresses opinions and constructs representations of people and events, and consider expressed and implied judgments

***Word* knowledge**

Understand learning area vocabulary - use subject-specific vocabulary to express abstract concepts, and refine vocabulary choices to discriminate between shades of meaning

Information and Communication Technology (ICT) Capability

Applying social and ethical protocols and practices when using ICT

- Identify the impacts of ICT in society - assess the impact of ICT in the workplace and in society, and speculate on its role in the future and how they can influence its use

Australian Curriculum: Design and Technologies

Achievement Standard	Content descriptions	Curriculum into the Classroom
By the end of Year 10, students explain how people working in design and technologies occupations consider factors that impact on design decisions and the technologies used to produce products, services and environments. They identify the changes necessary to designed solutions to realise preferred futures they have described. ..., students evaluate the features of technologies and their appropriateness for purpose for one or more of the technologies contexts...	**Design and Technologies knowledge and understanding** Technologies and society: the use, development and impact of technologies in people's lives Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040) Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041).	**Design and Technologies Unit 3 – Engineering principles and systems: Efficient dynamics** In this unit, students investigate and make judgments on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions. They critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures.

Australian Curriculum: Digital Technologies

Year	Achievement Standard	Content descriptions
10	By the end of Year 10, students explain the control and management of networked digital systems... They define and decompose complex problems in terms of functional and non-functional requirements. ..... They evaluate information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise.	**Digital Technologies Knowledge and Understanding** Investigate the role of hardware and software in managing, controlling and securing the movement of and access to data in networked digital systems (ACTDIK034) **Digital Technologies Processes and Production Skills** Design the user experience of a digital system by evaluating alternative designs against criteria including functionality, accessibility, usability, and aesthetics (ACTDIP039) Evaluate critically how student solutions and existing information systems and policies, take account of future risks and sustainability and provide opportunities for innovation and enterprise (ACTDIP042)

Australian Curriculum: Science

Year	Achievement Standard	Content descriptions
10	They explain the concept of energy conservation and represent energy transfer and transformation within systems. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes.	**Science Understanding** **Physical Sciences** Energy conservation in a system can be explained by describing energy transfers and transformations (ACSSU190) **Science as a Human Endeavour** **Nature and development of science** • Advances in scientific understanding often rely on technological advances and are often linked to scientific discoveries (ACSHE192) **Use and influence of science** • People use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people's lives, including generating new career opportunities (ACSHE194) • Values and needs of contemporary society can influence the focus of scientific research (ACSHE230)

Senior Syllabus (Years 11-12 Subjects)

Suggested links to senior syllabus subjects are provided below. The relevant course objective or topic is provided, along with an excerpt from the syllabus.

Science in Practice

Core topic 1: Scientific literacy and working scientifically

Electives:

- Resources, energy and sustainability: "Solutions to humanity's energy and resource challenges are likely to come from the application of science and technology."
- Discovery and change: "Students should examine discoveries in science or where scientific understanding has been challenged and modified. The motives for doing science can include natural curiosity; seeing economic opportunity; and recognition of threats to health, safety, or the national or personal interest."

Engineering Technology

Area of study: Technology, industry and society

"Historically, developments in technology and industry have led to changes in lifestyle that continue to have an impact on worldwide societies, including Australia's Indigenous communities. It is important, therefore, for students to appreciate the interdependence that occurs among technology, industry and society."

Technology Studies

Dimension 1: Analysing design problems

"The dimension Analysing design problems involves identifying a design problem and analysing the knowledge and understanding, referred to as design factors, required to respond to and develop solutions. Design problems can be found in a variety of contexts. Students should consider both individuals and communities when responding to an identified human need or opportunity."

Design factors:

- User-centred design: "When solving design problems, the purpose is to identify the human need or capitalise on an opportunity with a view to developing a solution that functions and satisfies the user."
- Sustainable design: "When developing sustainable solutions consideration must be given to the impacts of social, economic and environmental sustainability in all stages of a design process."
- Communication: "Communication is used throughout all stages of a design process and conveys how solutions were achieved. Communication includes visual and written formats. Spoken modes may also be considered."
- Manufacturing technologies: "Tools, processes and equipment are selected according to the solutions to "be developed.

Information and Communication Technology

Core topic 3: ICT in society

Concepts and ideas: "Society is affected by past, new and emerging ICT.

Science 21

Scientific Priorities

Technology (Tech): "Scientific development is critically dependent on the development of scientific technologies. Some technologies are developed specifically for furthering science itself."

Catalysts for discovery (CfD): "Unique circumstances often precipitate rapid progress in science. These unique circumstances include: crises, global change, the work of exceptional individuals, new frontiers for exploration and economic opportunities."

Environment (Env): "Science informs complex global problems. The advances in all areas of science, together with enormous increases in computing power and communication technologies, are making it possible to address these problems. These advances hinge on the collaboration of experts in many fields working in interdisciplinary teams. On a personal level, it is socially responsible to develop an understanding of the issues and to contribute to informed community debate."

Suggested questions & key ideas to support student learning

This event provides an opportunity for students to investigate and evaluate a real-world example of disruptive technology, where a technological product, service or environment impacts the way people live, interact or do business. The curriculum focus across the subjects in Years 10 – 12 listed above relate primarily to the use and impact of science and technologies in society.

Example topics for discussion, research or critical analysis that can drive extended learning are provided below:

- The changes to society, such as lifestyle, social interaction, business and the broader economy that arise from innovations in driverless technologies and drones.
- The factors such as social, ethical and sustainability considerations, that impact on these designed solutions for global preferred futures.
- The needs and opportunities that have given rise to these technologies.
- The criteria for success for specific innovations such as driverless vehicles or drone delivery, and evaluate how well existing, trial or projected implementations meet them and identified needs.
- Evaluate how well these technological solutions have taken into account sustainability (including economic, social and environmental) and future risks, and opportunities for innovation and enterprise.
- How advances in science can affect people's lives, including generating new career opportunities in this context.
- The specific scientific understandings or technologies were applied in the solutions?
- The factors that impact on the designed solutions: What emerging technologies or scientific discoveries or principles have been applied to create these technologies?
- How the values and needs of contemporary society influence the focus of scientific research in transport and communication.
- How products and technologies have evolved in response to changing perceptions of preferred futures.
- How design thinking can be applied including designing user experience and consideration of user needs.
- How systems thinking can be applied, exploring the interrelationships (such as cause and effect) between different components of the systems involved.