

Young Scholars Project

The Sum of Our Parts

Year 11 Immersive Day Overview

Goals

USC's Young Scholars Project has developed a Year 11 Biology Immersive module with a research component which aims to:

- Encourage students to develop skills in the process of inquiry, critical thinking, discerning quality research literature
- Inspire and challenge students to extend their learning in Science
- Promote a critical and an action-based approach to problem solving and design thinking
- Encourage students to consider vital questions that are not only based in Biological Science, but also directly impact upon their own health and well-being
- Promote collaboration between USC and local secondary schools

During the Immersive component at USC, students will travel to the Sippy Downs campus to engage with 'experts in the field' through hands-on activities, state of the art technology, digital media, workshops and interactive tasks which are designed to enrich their Biology studies and illuminate pathways to a career in STEM.

The module builds upon one or more concepts within the Australian Secondary Science Curriculum (Biology). Young Scholars Project is not designed to replace content in the learning sequence of an Australian Curriculum unit. It is an extension resource that students engage with alongside the learning sequence and assessment tasks of the existing unit.

USC Immersive Day

The Immersive Day at USC Sippy Downs is designed to involve Year 11 Biology students in a range of activities and demonstrations that will enhance their understanding of the interactive nature of systems within the human body: hence the module's name: ***The Sum of Our Parts***.

The Immersive Day is made up of a circuit of four activities in the AM session, followed by a Lab investigation, and conclude with a reflective brainstorming session with USC pre-service STEM teachers.

Each leader is a STEM specialist with collective specialisations across the fields of Science, Chemistry, Digital and Interactive media development, Biology, Maths, HPE and Psychology.

The rotation circuit will flow as below:

EMERGENCY!

- Students will visit the **Paramedics Hub**, where they will encounter a simulation involving an illegal substance overdose. An emergency is now in play.
- Assoc. Prof. Bill Lord and USC Paramedicine academics will talk students through the scenario and explain the biological processes that are going on inside the body and how their intervention reverses the process.

Systems Interacting

- Students will experience a larger-than-life 3D overview of the interaction of the circulatory and respiratory systems in the USC Visualisation Studio (Cave 2).
- Activity will be facilitated by 2D/3D designer, Simon Orsborn and PhD candidate (Sport and Exercise Science), Angela Hinz.

The Good, the Bad and the Ugly

- An interactive workshop where PhD candidate (Chemistry) Danny Meloncelli will help students to start thinking critically when they research for school assignments.
- Danny will guide students through the process of discerning between the good, the bad and the ugly information that exists out in the ether. The take home message is the value of critical thinking and its importance in study at school and beyond.

Incredible Biotech

- Associate Professor Joanne Macdonald will lead this session, which sees students carrying out a test that has been developed by leaders in the rapid detection of mosquito-borne viruses. They will experience the incredible speed at which diagnostics work in 2018.

After-Lunch in the Lab

A whole cohort Lab investigation will take place in the USC Teaching Labs with PhD candidate Beth Brunton. Students will move through a series of tests including Spirometry and blood pressure, recording their biostatistics and gaining valuable experience in using state-of-the-art data logging software.

Reflective/Brainstorming session

Students will return to their small groups and take part in a reflective/brainstorming discussion. Each group will reflect upon their experiences during the day and respond to a stimulus question that relates to one or more of the activities of the Immersive module. The questions are designed to help students make the link between their Biology studies and their own lives: how can their knowledge of Biology improve their lives and those around them (friends, family, the greater community, global community). This segues into a discussion about pathways to STEM study and careers.

Available learning resources

Young Scholars Project website (www.youngscholarsproject.edu.au)

The website has been created as a place you can return to in the future to find tips and hints on research and referencing, teamwork and presentation skills.

Research Resource Guides

These guides provide you with research stimulus questions linked to the hands-on experiences from the Immersive Day. You could approach these questions on your own, or as a group. The guides assist you in the process of breaking down a research task by:

- breaking the question down into its relevant parts
- assisting you in scaffolding your approach to addressing the question
- pointing you in the direction of credible starting points for literature research

Referencing and Research Skills

These tip sheets contain vital information on:

- how to approach the research process (where to start, planning your response, what resources to use)
- how to accurately reference your research findings

Teamwork Tips

Teamwork Tips will alert you to the common highs and lows encountered by anyone who is required to present as part of team. It will show you how to enhance the highs and lessen the lows.

Pathways to a STEM career

Perhaps you are considering a future in Science. Take a look at this tab to get some information and hints on what a career in STEM may look like for you.

Queensland Curriculum and Assessment Authority alignment

The module has been written to enrich some of the key concepts and key ideas contained within the [Queensland Curriculum and Assessment Authority Biology](#) (2004; amended 2006 and 2014) Syllabus.

Key Concept 1	Cells are the functioning units of all living things
Key Concept 2	Multi-cellular organisms are functioning sets of interrelated systems
Key idea 3	There are different types of cells and the ways they are organised influence their functioning
Key idea 4	Energy require by all living things is obtained in different ways
Key idea 6	The set of systems comprising an organism enables it to function in its environment
Key idea 7	All systems are interrelated and interdependent
Key idea 8	Systems of the body work together to maintain a constant environment
Key idea 10	Malfunctioning in one system or part of a system may affect the whole organism
Key idea 11	The external features and internal functioning of organisms together enable an organism to obtain its needs.

Australian Senior Secondary Curriculum: Science (Biology)

The table below demonstrates how the activities and research stimulus questions included in *The Sum of Our Parts* support the most recent version of the Australian Senior Secondary Curriculum (as at 20th July 2017).

Curriculum Descriptor	YSP Activities and Resources
Unit 2: Learning Outcomes	
Understand that multicellular organisms consist of multiple interdependent and hierarchically-organised systems that enable exchange of matter and energy with their immediate environment	The Cave; Lab investigation
Use science inquiry skills to design, conduct, evaluate and communicate investigations into the structure and function of cells and multicellular organisms	Research workshop; Lab investigation Stimulus Research Questions
Evaluate, with reference to empirical evidence, claims about cellular processes and the structure and function of multicellular organisms	The Cave; Stimulus Research Questions
Communicate biological understanding using qualitative and quantitative representations in appropriate modes and genres	Research workshop; Lab investigation Stimulus Research Questions
Unit 2: Science Inquiry Skills (Biology)	
Identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes (ACSBLO30)	Research workshop YSP Website: Research Skills Research Questions 1-4
Represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error, and uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions (ACSBLO33)	Research workshop YSP Website: Research Skills Stimulus Research Questions
Interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	Research workshop YSP Website: Research Skills Stimulus Research Questions
Communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports (ACSBLO36)	Research workshop YSP Website: Research Skills Stimulus Research Questions
Units 1 and 2: Science as a Human Endeavour	
Science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility (ACSBLO37)	YSP Website: Research Skills Stimulus Research Questions
Advances in science understanding in one field can influence other areas of science, technology and engineering (ACSBLO39)	Engage Lab; The Cave; Stimulus Research Questions
Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability (ACSBLO43)	Engage Lab; Stimulus Research Questions
Unit 2: Science Understanding (Multicellular organisms)	
Improvements in technologies to store and transport living tissue and the development of immunosuppressive drugs to decrease rejection by transplant recipients have led to increasing numbers of people benefiting from organ and tissue transplants (ACSBLO39).	The Cave; Engage Lab
Multicellular organisms have a hierarchical structural organisation of cells, tissues, organs and systems (ACSBLO54)	The Cave