USC

Course Outline

Code: SCI113
Title: Discovering Science

School: Science & Engineering
Teaching Session: Semester 1
Year: 2019
Course Coordinator: Peter Davies Room: J.5.27 Phone: 5456 5041 Email: pdavies1@usc.edu.au
Course Moderator: Adrian McCallum Room: H1.2.46 Phone: 5459 4576

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered

1. What is this course about?

1.1 Description

Science and the study of the universe has always inspired awe and fascination. Whether on the grand scale of big ideas, sub atomic scales or the intricate complexities of life, the urge to discover new frontiers drives us as a species. This course will spark your curiosity and engage you in the world of scientific inquiry. During lab and field activities you will explore your skills of investigation, presenting data and critical analysis and apply these across disciplines through 'Big Idea' modules that introduce you to the cutting edge of science, research and technology.

1.2 Course topics

- Philosophy of science and technology
- Hypotheses, theories and evidence
- Big Ideas – from the Big Bang to DNA
- Investigative methods in science, laboratories / field trips
- Inquiry based modules; Biology, Chemistry, Maths, Biotechnology, Ecology, Food and Biosecurity.
- Scientific communication
- Ethics and sustainability
- Future frontiers for science

2. What level is this course?

100 level Introductory - Discipline knowledge and skills at foundational level, broad application of knowledge and skills in familiar contexts and with support. Normally associated with the first full-time year of an undergraduate program

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

Specific Learning Outcomes On successful completion of this course you should be able to:	**Assessment Tasks** You will be assessed on the learning outcome in task/s:	**Graduate Qualities or Professional Standards mapping** Completing these tasks successfully will contribute to you becoming:
Demonstrate foundational scientific knowledge in core disciplines (biology, chemistry, math, biotechnology, ecology, food and biosecurity)	1. Narrated PowerPoint 2. Laboratory / Tutorial Quizzes 3. Scientific Report	Knowledgeable
Apply the methods of science to collect, accurately record, interpret and draw conclusions from observational and experimental data to solve different real world problems	1. Narrated PowerPoint 2. Laboratory / Tutorial Quizzes 3. Scientific Report	Empowered. Creative and critical thinkers.
Explain the role and relevance of science in society and consider the impact of solutions to current and future real world problems	1. Narrated PowerPoint 2. Laboratory / Tutorial Quizzes	Sustainability Focussed Ethical
Communicate scientific results, information and arguments to a range of audiences, for a range of purposes and using a variety of modes.	1. Narrated PowerPoint 3. Scientific Report	Engaged.

5. Am I eligible to enrol in this course?

Refer to the USC Glossary of terms for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1 Enrolment restrictions

None

5.2 Pre-requisites

None

5.3 Co-requisites

None

5.4 Anti-requisites

None

5.5 Specific assumed prior knowledge and skills (where applicable)

None

6. How am I going to be assessed?

6.1 Grading scale

Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

6.2 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1	Narrated PowerPoint	Group	Proposal 5% Submission: 15%	Proposal: 1 PowerPoint slide; single paragraph of accompanying text Submission: 5 PowerPoint slides with accompanying audio or text	Proposal: Week 2; Submission; Week 5	Proposal in tutorial; Submission via Blackboard
2	Laboratory / Tutorial Quizzes	Individual	4 x 10%; 40%	30 minute quizzes; 10 multiple choice questions each	Weeks 2,5,8 and 11	Blackboard
3	Scientific Report	Individual	40%	2000 words	Week 15	Blackboard
			100%			

Assessment Task 1: Narrated PowerPoint

Goal:	This task will develop your collaboration skills in presenting scientific ideas and research, culminating in a group submission. Key to the exercise is working with other science students in investigating the application of a field or discipline in a Mission to Mars and engaging the audience in your chosen field of study. This submission should be engaging and creative but also scientifically rigorous and concise.
Product:	Proposal: A single PowerPoint slide with a single paragraph of accompanying text Submission: 5 PowerPoint slides with accompanying audio or text for each slide
Format:	In groups of no more than four you will investigate a proposed mission to the planet Mars. Choose **one** of the core science disciplines (biology, chemistry, mathematics, biotechnology, ecology, food and biosecurity) offered at USC and consider how the discipline may be applied to a single aspect of the mission. How will we get there? What spacecraft, fuels or trajectories may be used? How will humans survive the spaceflight? How will we grow food or obtain water? What basic ecology could we potentially find, if any? Are there any other issues of concern that you feel may be relevant to the mission? What biosecurity concerns are there? You will research and brain storm in your group the foundational knowledge required for the mission in your chosen discipline, some of the interesting research occurring in this field and a summary of the issues faced and possible solutions for these issues. Your group will then initially provide a single PowerPoint slide as a proposal (week 2; one per group) then submit the completed assessment (5 PowerPoint slides and accompanying audio or text) via Blackboard (week 5; one per group). Additional instructions and guidance will be provided via Blackboard.
Criteria:	You will be assessed on your ability to: • Demonstrate foundational scientific knowledge in a core discipline: use of correct terminology, specific field content and applications • Explain the role and relevance of the chosen discipline to the proposed mission to Mars and its potential application in solving current and future real world problems • Communicate scientific information and areas of emerging research to an audience of teaching staff. • Collaborate: demonstrated equity of submission among group members

Generic skill assessed	**Skill assessment level**
Collaboration	Introductory
Communication	Introductory

Assessment Task 2: Laboratory / Tutorial Quizzes

Goal:	The purpose of the quizzes is to formatively assess foundational knowledge across the breadth of core science disciplines presented during the first eleven weeks of the course. The quizzes will be based on the laboratory and tutorial manual and the questions covered during each week's content. You will link this knowledge to the addressing of problems in the real world – highlighting further applications that may arise from research in this area.
Product:	Laboratory / Tutorial quizzes; 4 x 10 questions (multiple choice format)
Format:	The format for this task will be in the form of 4 separate quizzes assessing each of the specific discipline areas presented during the course.: • Week 2 – Science Basics • Week 5 – Maths and Chemistry • Week 8 – Biology and Ecology • Week 11 – Biotechnology, Food and Biosecurity Each quiz will be open for two weeks from the opening date and will take approximately 30 minutes to complete; you will be permitted three (3) attempts at each quiz.
Criteria:	You will be assessed on your ability to: • Demonstrate foundational depth and breadth of knowledge in the scientific disciplines presented during the course. • Apply the methods of science to answer questions and to explain the role and relevance of the scientific disciplines presented during the course • Explain and consider the impact of solutions to current and future real world problems • Demonstrate the interdependence between scientific fields

Generic skill assessed	**Skill assessment level**
Communication	Introductory
Applying technologies	Introductory

Assessment Task 3: Scientific report

Goal:	In this task you will consider the findings from one of the lab sessions held in weeks 1, 3, 5, 7, 9 or 11 and write a scientific report based on the results obtained. This will allow you to complete the process of a scientific inquiry and to demonstrate foundational knowledge in a core science discipline (either biology, chemistry, math, biotechnology, ecology, food or biosecurity) through written communication and interpretation of scientific results.
Product:	Individual Scientific Report: 2000 words
Format:	The format for this paper will be a general 'IMRaD' report template reflecting the format usually incorporated in scientific papers. It will be written individually in your own words. Additional instructions and guidance will be provided via blackboard and during class. **Title** – Brief and specific. **Introduction** – The purpose of the introduction is to provide a brief rationale of why the research was conducted, some background and a statement of purpose for the paper. You should also detail the extent of current knowledge and include references from the scientific literature. The introduction should also state what your research question / hypothesis is and explain why the project is of interest. **Materials and Methods** – A logical, concise sequence of the materials and methods used that a fellow scientist could follow to carry out the exact procedure as the one used. **Results -** The results section shows all the relevant findings from the lab session examined. You should present a **summary** of the data generated (summaries belong in results; the raw data (data sheets) should be included in the appendix); these should be achieved by the presentation of tables and/or graphs (full standalone titles), with written text before the figure / table that refers the reader to particular results that provide an indication of trends, consistencies, comparisons, anomalies etc. While you may state basic trends, **you must not interpret or explain the result in any way.** This is what the discussion is for!

	Discussion – Is the most important section of your report, where the results are discussed in light of your original purpose as stated in the introduction using appropriate references to support your interpretations. You must interpret the outcomes and explain the processes that led to the results obtained. What factors explain the variability in the results? Did the study achieve the objectives stated? Did the study concur with others or not? What were the limitations of the study and how could they be improved? **Summary** – conclusions – what is the relevance of this research for both the scientific community and wider society? **Referencing** – In text and reference list as appropriate to specific discipline
Criteria:	You will be assessed on your ability to: • Demonstrate foundational knowledge in science: • Use correct terminology and specific content of your chosen discipline. • Use scientific writing style to convey knowledge, explain processes, interpret results and provide ideas for improving future studies. • Explain the relevance of the research to the scientific community • Use appropriate scientific references

Generic skill assessed	**Skill assessment level**
Communication	Introductory
Organisation	Introductory
Information Literacy	Introductory

7. What are the course activities?

7.1 Directed study hours

1 hour Lecture weekly
3 hour Laboratory sessions in odd weeks (1,3,5,7,9,11 and 13)
2 hour Tutorial sessions in even weeks (2,4,6,8,10 and 12)

7.2 Teaching semester/session(s) offered

Sippy Downs: Semester 1
Fraser Coast: Semester 1

7.3 Course content

Teaching Week / Module	What key concepts/content will I learn?	What activities will I engage in to learn the concepts/content?	
		Directed Study Activities	**Independent Study Activities**
Introductory	Week 1: Science and the evolution of Ideas – Evidence, Theories and Laws. Week 2: Separating Science 'Fact' from Science 'Fiction' - Critical thinking skills for science. Evolution of ideas: 'Is there life on Mars?'	1 hr lecture 3 hr lab: Chemical Rocket: Observations / hypotheses; Measurement of time, distance, velocity, thrust. 1 hr lecture 2 hr tutorial: Task 1 proposal: A Mission to Mars	Readings and resources detailed on Blackboard

Chemistry / Maths	Week 3: The Big Bang and expansion of the universe Week 4: Current travel through the universe, Propulsion systems and trajectories. Week 5: Composition of matter, distribution of elements	1 hr lecture 3 hr lab: Terraforming Mars – A simulated Martian soil 1 hr lecture 2 hr tutorial: Space, time and distance 1 hr lecture 3 hr lab: Building a Spectroscope	Readings and resources detailed on Blackboard
Biology / Ecology	Week 6: The Origins of Life on Earth and mass extinction events Week 7: Biology and responses to changing environments Week 8: Ecological adaptations; radiation and distribution of organisms	1 hr lecture 2 hr tutorial: Dating Techniques and the fossil record. 1 hr lecture 3 hr lab: Euglena - – Plant or Animal / Phototroph or Chemotroph? 1 hr lecture 2 hr tutorial: Evolutionary interactions workshop	Readings and resources detailed on Blackboard
Food/ Biosecurity Biotechnology	Week 9: Global food production and food security Week 10: Biosecurity and Biotechnology: How can we increase our food supply and availability? Week 11: Does more people mean more disease? Biotechnology for health and beyond.	1 hr lecture 3 hr lab: What's in our food and how can we analyse the contents? 1 hr lecture 2 hr tutorial: Debating the serious issues in food supply: food choices, food waste, pesticides & Gm, land sharing, biodiversity, and biofuels. 1 hr lecture 3 hr lab: Bio-surveillance and forensics: biotechnology solutions	Readings and resources detailed on Blackboard
Scientific Communication	Week 12: Sticking up for science - Dissemination of science to scientists and non-scientists Week 13: Future frontiers	1 hr lecture 2 hr tutorial: The changing face of science communication and the dissemination of ideas 1 hr lecture 3 hr lab: Task three discussion and course wrap up	Readings and resources detailed on Blackboard

Please note that the course activities may be subject to variation.

8. What resources do I need to undertake this course?

Please note that course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site. Please log in as soon as possible.

8.1 Prescribed text(s)

Please note that you need to have regular access to the resource(s) listed below as they are required:

Author	Year	Title	Publisher
tba			

8.3 Specific requirements

Nil

9. Risk management

Risk assessments have been performed for all laboratory classes and a moderate level of health and safety risk exists. Moderate risks are those associated with laboratory work such as working with chemicals and hazardous substances. Risk assessments have been performed for all field activities and a low level of health and safety risk exists. Some risks concerns may include working in an unknown environment as well as slip and trip hazards. You will be required to undertake laboratory induction training and it is also your responsibility to research and understand the risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students.

10. What administrative information is relevant to this course?

10.1 Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2 Assessment: Additional requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

a) The final mark is in the percentage range 47% to 49.4%
b) The course is graded using the Standard Grading scale
c) You have not failed an assessment task in the course due to academic misconduct

10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

Weekdays and weekends are included in the calculation of days late. To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to Student Hub.

Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:
http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.6 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast -** Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au