Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science and Sustainability

Unit Title: GEOCHEMICAL AND GEOPHYSICAL TECHNIQUES

Unit ID: SCGEO3115

Credit Points: 15.00

Prerequisite(s): (SCGEO1103) (At least 105 credit points from ANY subject-area at any level)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 010705 and 010707

Description of the Unit:

This course introduces students to key concepts in the fields of exploration and environmental geology. Students will learn about the physical and chemical properties of the planet and develop skills in manipulating and interpreting exploration and environmental geophysical and geochemical data, as well as experience a range of sampling methods and analytical techniques.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory						

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Intermediate						
Advanced			✔			

Learning Outcomes:

Knowledge:

K1. Explain the key concepts and principles of geophysical and geochemical exploration

K2. Compare and contrast the physical properties of Earth materials as they relate to geophysical interpretation.

K3. Determine the appropriate geophysical exploration techniques for a given natural resource exploration program or environmental investigation.

K4. Explain the value and limitations of the application of geophysical techniques in geological interpretation of the Earth.

K5. Appraise and analyse the variety of geochemical sampling methods and techniques in the context of exploration, environmental and material/mining applications

K6. Assess the role of element dispersion in exploration and environmental contexts

Skills:

S1. Appraise and select geophysical techniques for natural resource exploration programs and environmental applications.

S2. Apply practical field data collection procedures.

S3. Analyse and interpret geophysical and geochemical data in exploration, environmental and material/mining contexts and communicate key concepts

S4. Apply and appraise appropriate Quality Assurance/Quality Control techniques into relevant sampling procedures and data analysis.

Application of knowledge and skills:

A1. Analyse geophysical and geochemical data sets to assist in interpreting geological structures and processes.

A2. Select appropriate geophysical and geochemical exploration techniques for a range of settings

A3. Provide advice on the selection of geophysical techniques

A4. Demonstrate research and communication skills

Unit Content:

The course is core in the Geology stream of the Bachelor of Science. Other students may select this course to provide a background for a career in the environmental geosciences or environmental engineering industries.

Topics may include:

- Geophysical methods, including: Gravity, Resistivity, Magnetism, Electromagnetism, Seismic and others.
- Basic chemical principles such as pH, Eh, solubility, dispersion, standards, precision/accuracy, contamination, speciation, and chemical data presentation for specific purpose
- Geochronoly and dating rocks and minerals with radioactive isotopes.
- Analytical methods and their cost benefits

- Survey methods including stream sediment, soil, rock, biogeochemistry, gas, water and questionnaire
- Sampling theory and statistical analysis of geochemical data
- Chemical dispersion and its role in exploration and environmental geochemistry
- Environmental geochemistry: problems facing our community including landfill and contaminated sites

FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**ttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are be embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		**Development and acquisition of FEDTASKS in the Unit**	
		Learning Outcomes (KSA)	**Assessment task (AT#)**
FEDTASK 1 Interpersonal	Students will demonstrate the ability to effectively communicate, interact and work with others both individually and in groups. Students will be required to display skills in-person and/or online in: • Using effective verbal and non-verbal communication • Listening for meaning and influencing via active listening • Showing empathy for others • Negotiating and demonstrating conflict resolution skills • Working respectfully in cross-cultural and diverse teams.	K2-K6, S1, S3, A1-A3	AT1, AT2, AT3
FEDTASK 2 Leadership	Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in: • Creating a collegial environment • Showing self -awareness and the ability to self-reflect • Inspiring and convincing others • Making informed decisions • Displaying initiative	S2, S3	AT2
FEDTASK 3 Critical Thinking and Creativity	Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in: • Reflecting critically • Evaluating ideas, concepts and information • Considering alternative perspectives to refine ideas • Challenging conventional thinking to clarify concepts • Forming creative solutions in problem solving	S3, A1, A2, A3	AT2, AT3
FEDTASK 4 Digital Literacy	Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in: • Finding, evaluating, managing, curating, organising and sharing digital information • Collating, managing, accessing and using digital data securely • Receiving and responding to messages in a range of digital media • Contributing actively to digital teams and working groups • Participating in and benefiting from digital learning opportunities	K1, K4, S3, A4	AT1, AT2, AT3

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 5 Sustainable and Ethical Mindset	Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in: • Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts • Committing to social responsibility as a professional and a citizen • Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses • Embracing lifelong, life-wide and life-deep learning to be open to diverse others • Implementing required actions to foster sustainability in their professional and personal life.	Not applicable	Not applicable

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K4, K5, S1, S3, A1, A2, A3, A4	Written reports addressing basic concepts and technical problem solving.	Practical Assignments	30-50%
K2, K3, K4, K6, S2, S3, S4, A1	Producing and interpreting geophysical and geochemical data	Report	10-20%
K1, K2, K3, K4, K5, A1, A3	Theory test to assess student understanding of key concepts	End of Semester Test(s)	30-50%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

Adopted Reference Style:

APA

Refer to the library website for more information

Fed Cite - referencing tool