

# GEOS384

# Earth and Planetary Sciences Special Interest Seminar

WV External 2018

Dept of Earth and Planetary Sciences

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

# **General Information**

Unit convenor and teaching staff Professor, Environmental Science Professor Mark Patrick Taylor mark.taylor@mq.edu.au Contact via 02 9850 4221 12 Wally's Walk, 433 30 June - 13 July (field course) and by arrangement

Lecturer Dr Paul Harvey paul.harvey@mq.edu.au

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Guest Professor Professor A Russell Flegal flegal@ucsc.edu Contact via n/a n/a n/a

Credit points 3

Prerequisites Permission by special approval

Corequisites

Co-badged status

Unit description

In this unit a choice of seminars may be offered, each specialising in a particular area of interest in the Department of Earth and Planetary Sciences. The areas of interest are based upon individual staff and/or student interest. Intended seminar offers are advertised within the department, and offers are formalised during the enrolment period. Students are asked to note that University Regulations state that no unit taken under the same code number can be counted more than once for credit towards a degree; accordingly they must take care to select the most appropriate of the topics on offer. Students wishing to enrol in this unit are required to check with advisers about topics on offer prior to enrolling.

### Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <a href="https://www.mq.edu.au/study/calendar-of-dates">https://www.mq.edu.au/study/calendar-of-dates</a>

# **Learning Outcomes**

On successful completion of this unit, you will be able to:

Expose students to a different environment and culture.

Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.

Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.

Develop student knowledge and skills of operating in international field environments. Train students in how to complete a scientific report.

# **General Assessment Information**

#### What is required to complete this unit satisfactorily?

- Attendance: (fairly obvious) you have to turn up to complete the unit.
- Assignments: you must hand in/complete ALL the assessment tasks to complete the unit.
- Attitude: look, read, ask, discuss, debate, enjoy (you have been selected and are supported by the University in part to be on this expedition to Namibia).
- Quality: your assessment items will be graded according to your achievement of the learning outcomes. We are looking for deep understanding as well as competence in particular skills of data collection, analysis, interpretation and presentation. I am expecting that your work will be high quality and your commitment will match that.
- Honesty and sharing: you will often work in groups but all the assessment tasks are individual. Group data must be shared freely but presentation, writing up and interpretation are to be the efforts of each individual. Macquarie's procedures relating to academic honestyand plagiarismcan be found at <a href="http://www.mq.edu.au/policy/docs/academic\_honesty/policy.html">http://www.mq.edu.au/policy/docs/academic\_honesty/policy.html</a>

Macquarie University has a range of policies that relate to learning and teaching, including:

- assessment
- unit guide
- special consideration

These are available at Policy Central (http://www.mq.edu.au/policy/)

#### Workload / expectations for this unit

3 cp x 3hrs/wk/cp x 15 wks = 150hrs to be devoted to this unit according to University guidelines.

Pre-fieldtrip research and preparation of A4 handout = 20 hrs

Fieldwork (excluding air travel time) 13 days (30 June to 13 July) x 10 hrs/day = 130 hrs

Each day will be different but you should be prepared to start work at 8 am most days and work in the evenings on some days.

# Assessment Tasks

Name	Weighting	Hurdle	Due
Field sample plan	20%	No	1 July 2018
Field site presentation	20%	No	30 June – 12 July
Fieldtrip quiz	20%	No	12 July 2018
Tsumeb Site report	40%	No	13 July 2018 (0800 hrs)

### Field sample plan

Due: **1 July 2018** Weighting: **20%** 

This task involves preparing a suite of maps detailing your proposed field sampling strategy for the assessment of contamination at Tsumeb.

You will be provided with a set of maps for Tsumeb for use in ArcGIS ArcMap to prepare your field sampling approach and locations. You will allocate sampling sites, identify key environmental features and relevant infrastructure in order to perform an environmental contamination assessment around the Tsumeb smelter.

An ArcGIS training session will be provided on day and time to be advised. Following this, a prefield visit map must be submitted in PDF format (July 1 2018). A finalised map depicting the actual geo-referenced ground-truthed sampling sites and associated geochemical data MUST be included in the Unit's final assignment, which is due on 13 July 2018.

All students should obtain a copy of ArcGIS ArcMap for their personal computers, available through the Department of Environmental Sciences (email Dr Harvey at <u>paul.harvey@mq.edu.au</u> for your individual code/information).

This Assessment Task relates to the following Learning Outcomes:

- construct a sampling program that is logical and achievable for the Tsumeb smelter
- · define what guidelines, controls and benchmarks you will use to compare to your field

data

• use geographic information systems as a tool in conduction environmental contamination assessments.

On successful completion you will be able to:

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Train students in how to complete a scientific report.

### Field site presentation

Due: **30 June – 12 July** Weighting: **20%** 

This Assessment Task will comprise two parts each being equal to 10%:

- A4 single paged two-sided handout (10%): Each student will prepare a A4 two-sided summary of their talk as a field handout. These are to be uploaded to the Dropbox by 30 June 2018 (0900 AEST) AND you are required to provide 17 copies in the field. Your handout will explain and illustrate your selected topic (details below) using no more than one (1) A4 sheet of paper (using both sides, and listing any references you cite). You should have read and cited at least 3 primary, peer-reviewed sources. Assessment will be on the clarity, relevance and quality (e.g. accuracy, currency, organisation), of the 1-sheet handout (10%).
- 2. Five minute oral presentation (10%):Each student will also give a 5 minute oral presentation on their selected topic, in the field, and using only their 1 sheet (single or double-sided) handout and the landscape as resources. This will occur at intervals throughout the trip. Assessment will be on the clarity and quality (coherence, audibility, use of resources, ability to answer questions) of the oral presentation (10%). This will be *peer-assessed*(i.e. you will grade, and be graded by, your classmates). Your grade will be adjusted according to how many peer marks you return (i.e. full marks if you mark all your peers; half marks if you mark only 50% of your peers).

#### Full details will be provided separately.

On successful completion you will be able to:

• Expose students to a different environment and culture.

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Train students in how to complete a scientific report.

# Fieldtrip quiz

#### Due: **12 July 2018** Weighting: **20%**

This quiz will test learning and knowledge developed over the whole field trip. The quiz will be short answer questions.

This Assessment Task relates to the following Learning outcomes:

- · test knowledge and skills developed from the Unit's field experiences
- assess logical reasoning in environment science issues.

On successful completion you will be able to:

• Develop student knowledge and skills of operating in international field environments.

### **Tsumeb Site report**

#### Due: **13 July 2018 (0800 hrs)** Weighting: **40%**

Students will complete a comprehensive but succinct scientific report based on the data collected, compiled and assessed during fieldwork at Tsumeb. The report will detail the impacts of smelter contamination, its potential risk of harm and detail strategies for mitigation human health exposures.

#### Full details will be supplied separately.

On successful completion you will be able to:

- Expose students to a different environment and culture.
- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.

# **Delivery and Resources**

#### **Delivery and Resources**

There is no set text for this unit. The Unit Dropbox site (https://www.dropbox.com/sh/24sz1361nh 083uw/AADBX-Fly4YhB\_MVEVWqOgZRa?dl=0) will contain a folder with relevant references and readings.

However, students are encouraged to access the following items to familiarize themselves more broadly with Namibia:

- Goudie, A. and Viles, H. 2015. Landscapes and Landforms of Namibia, Springer, Dordrecht Heidelberg New York London. Available via the MQU library at: <a href="http://ink.springer.com/book/10.1007%2F978-94-017-8020-9">http://ink.springer.com/book/10.1007%2F978-94-017-8020-9</a>(accessed 3 May 2018).
- \*Martin, H. 1958 The Sheltering Desert. Thomas Nelson & Sons, Edinburgh. Available at: https://archive.org/details/shelteringdesert007109mbp (accessed 3 May 2018).
- The Sheltering Desert 1991 (movie): <u>https://www.youtube.com/watch?v=SuGRhqKruK</u> I(accessed 3 May 2018).

\*This book can typically be purchased in Namibia. It is a classic, true story.

# **Unit Schedule**

Date	Activity/location	Lecturer		
TSUMEB SMELTER RESEARCH				
30 June	Depart Windhoek for Tsumeb	All		
1 July	Visit to Etosha and Tsumeb www.uris-safari-lodge-namibia.com	All		
2-7 July	Field sampling, data collection and assessment of dusts, sediments and soils around Tsumeb	All		
VISITING VARIOUS SITES ACROSS THE NAMIBIA DESERT				
7 July	Spitzkoppe Camp <u>http://www.spitzkoppe.com</u> Spitskoppe, Cape Cross and Skeleton Coast	All		
8 July	Tiger Reef http://www.goingwhere.co.za/tiger-reef Swakopmund, Rossing Mine	All		
9-10 July	Wild Camping Kuiseb Canyon	All		

11-12 July	Oasis Camp http://www.sossus-oasis.com	All
	Sossusvlei	
	Naukluft	

# **Policies and Procedures**

Macquarie University policies and procedures are accessible from Policy Central (https://staff.m q.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-centr al). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- <u>Special Consideration Policy</u> (*Note: The Special Consideration Policy is effective from 4* December 2017 and replaces the Disruption to Studies Policy.)

Undergraduate students seeking more policy resources can visit the <u>Student Policy Gateway</u> (htt ps://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (http s://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/p olicy-central).

### **Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

#### **Results**

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in <u>eStudent</u>. For more information visit <u>ask.m</u> <u>q.edu.au</u>.

### Student Support

Macquarie University provides a range of support services for students. For details, visit <u>http://stu</u> dents.mq.edu.au/support/

### Learning Skills

Learning Skills (<u>mq.edu.au/learningskills</u>) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

### Student Services and Support

Students with a disability are encouraged to contact the **Disability Service** who can provide appropriate help with any issues that arise during their studies.

### **Student Enquiries**

For all student enquiries, visit Student Connect at ask.mq.edu.au

### IT Help

For help with University computer systems and technology, visit <u>http://www.mq.edu.au/about\_us/</u>offices\_and\_units/information\_technology/help/.

When using the University's IT, you must adhere to the <u>Acceptable Use of IT Resources Policy</u>. The policy applies to all who connect to the MQ network including students.

# **Graduate Capabilities**

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

### Learning outcome

• Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.

### **Assessment task**

Tsumeb Site report

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to

handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

#### Learning outcomes

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.

#### Assessment tasks

- Field site presentation
- Tsumeb Site report

# Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

#### Learning outcomes

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.

### **Assessment tasks**

- Field sample plan
- · Field site presentation
- Fieldtrip quiz
- Tsumeb Site report

# Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

### Learning outcomes

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Train students in how to complete a scientific report.

### Assessment tasks

- Field sample plan
- Fieldtrip quiz
- Tsumeb Site report

# Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

### Learning outcomes

- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.

### **Assessment tasks**

- Field sample plan
- Tsumeb Site report

# Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

#### Learning outcomes

- Expose students to a different environment and culture.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.

### Assessment tasks

- · Field site presentation
- Tsumeb Site report

### Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

#### Learning outcomes

- Expose students to a different environment and culture.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.

### **Assessment task**

• Fieldtrip quiz

### Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

### Learning outcomes

- Expose students to a different environment and culture.
- Develop student knowledge and skills of operating in international field environments.

### Assessment task

• Tsumeb Site report

# **Assessment expectations / further details**

#### Penalty for Late Submission

There is no room for lateness! However, if you should hand in some component late you will be penalised 20% each day.

#### **Extensions and Special Consideration**

There is no room for extensions either. However, if something comes up you must discuss an extension with a staff member BEFORE the deadline.

The only exception to not submitting an assessment item at the designated time is because of documented illness or unavoidable disruption. In these circumstances you should advise the unit convenor as soon as possible and you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the special consideration process is available at<u>htt</u> p://mq.edu.au/policy/docs/special\_consideration/policy.html

#### Grading

Grades for each assessment item and for the unit as a whole will be awarded according to the University guidelines (https://staff.mq.edu.au/work4/strategy-planning-and-governance/university-policies-and-procedures/policies/assessment):

#### • HD 85-100% (Pass)

Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality, insight or creativity in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the program.

#### • D 75-84% (Pass)

Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality or creativity in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the program and the audience.

#### • CR 65-74% (Pass)

Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the program.

#### • P 50-64% (Pass)

Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the program; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the program. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.

#### • F 0-49% (Fail)

Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the program.

#### • FH 49% (Fail Hurdle)

Student has obtained a raw mark over 50, yet failed all available attempts of at least one hurdle assessment (as described within Schedule 2: Unit Assessment Requirements).

# Learning Outcomes - Namibia

#### The field trip is experiential and will involves the following experiences:

- Expose students to a different environment and culture.
- Train students on how to undertake a remote (from Australia) geochemistry assessment using rapid, handheld field portable XRF technology.
- Train students how to collect, analyse and report on field rock, soil and dust geochemical analyses.
- Develop student knowledge and skills of operating in international field environments.
- Train students in how to complete a scientific report.
- Broaden Australian earth and environmental science students' knowledge about Namibia's unique natural phenomena, e.g.: vleis, hyper arid climate, ephemeral river systems, current mining and resource extraction; Naukluft's unique tufa (calcium carbonate depositing river systems).

Specifically, in relation to bullet point (2) above, the field trip will involve soil and dust metal

analyses at Tsumeb to measure the concentration and composition of contaminants. This component of the project will form the dominant field training exercise for the students. The research questions that the students will address will include:

- What are the spatial distribution of soil and dust metal contaminants in the township of Tsumeb?
- What is their spatial relationship to the Tsumeb smelter, prevailing wind patterns and land use types (e.g. industrial, residential, open space)?
- How do the measured field values compare with background values and international values?
- On the basis of observations and data analysis what environmental management strategies are likely to be useful in mitigating any identified concerns?

It is intended that by the end of this unit you will have further developed *field and analytical skills* that are considered essential for environmental science enquiry, with a strong focus on contaminated landscapes. You will also have developed your *knowledge* of landscape geomorphology and related processes in a very arid environment.

By the end of this unit you should have enhanced your skills in the following areas:

- environmental contaminants and human health
- field skills related to contaminated land assessment (soils, dusts, sediments)
  - $\circ~$  the use of a portable XRF for field geochemistry research
  - how to collect field samples using standard methods
  - how to analyse samples using portable XRF
  - quality control procedures in field sampling and analysis
- analyse field data using statistical tools to determine the significance of trends
- · design a field research project including data gathering and interpret your own data
- communicate / translate scientific information and concepts through oral, visual and written formats
- read and interpret the landscape relating to geomorphological and geological processes.

A core principle in this unit, as a representative of Macquarie University and as a scientist more generally, is that all data collection should be undertaken in a manner that is rigorous, honest, reliable and repeatable. Data collection should be structured in a manner to address a clearly-specified question. The data themselves should be irrefutable facts, that support findings and recommendations arising from your work. This approach should assist you in further learning about applying the evidence-based approach to your discoveries to better and accurately inform others about the nature and extent of an issue and what to do next, if anything.

# **Unit description**

The Namib desert is one of driest deserts in the world and is home to a unique geological,

environmental and cultural landscape. The Unit will include an assessment of Namibian environmental systems to provide Macquarie students a unique training and learning experience.

The Unit learning and teaching will include real-world field skills development for examining contemporary environmental contamination. This will be based on a study of the Namibian smelter town called Tsumeb.

The unit training will include pre-field trip desktop analysis and project design, field sampling, analysis and field trip reporting. The program's intention is to prepare students on the realities of how to execute a field contamination study and to complete a project report of a suitable standard for presentation to external clients. Participating students will learn how to use handheld XRF for field sampling, dust deposition analysis and how to model exposures.

The field trip will also examine historic (copper) and contemporary mining (uranium) impacts. Field learnings and experiences will also include exploring Namib's Sand Sea Desert, the role of fog deposition on environmental systems, Namibia's unique river systems that terminate before reaching the ocean in vleis and some of the tufa (calcium carbonate) depositing systems of the Namib desert.

The field trip will also examine historic (copper) and contemporary mining (uranium) impacts. Field learnings and experiences will also include exploring Namib's Sand Sea Desert, the role of fog deposition on environmental systems, Namibia's unique river systems that terminate before reaching the ocean in vleis and some of the tufa (calcium carbonate) depositing systems of the Namib desert.

# **Changes since First Published**

Date	Description
15/05/2018	Various edits. Thanks