GEOLOGY
400 LEVEL
HANDBOOK
2019

The purpose of the 400 level is very different to that of undergraduate level. The foundations have now been laid and now the goal is for you to develop the skills required to conduct thorough and robust research and critical analysis. That means you will need to undertake and write up your own research (in GEOL480/490/495) and you will need to be able to critically assess ideas and understand high level analytical techniques. **400 level is not easy; it is a busy year in which you will need to be able to balance undertaking a detailed independent research project with work required for the individual papers**.

400 level optional papers

Each paper is worth **10 points**. The university expects that **1 point = 12 hours of work**. This includes meetings, fieldtrips, tutorials, readings and exam preparation.

The optional 400 level papers are different to undergraduate lectures. The classes are about critical thinking and analysis – these are skills that are highly valued in the workplace regardless of where you end up. **Most papers require 2 - 3 hours of reading (and note-taking) of assigned journal articles before each class**.

Assessment

Each 400 optional level paper has a component of internal assessment and, most likely, a final exam. This Handbook does not contain information on the content of the optional papers: information will be given by the coordinators of each paper.

Optional papers offered

Honours students must choose **four papers in total (2 in semester 1, and 2 in semester 2)**. PGDipSci and MSc students must choose **six papers in total (3 in semester 1, and 3 in semester 2)**. The topics covered in each paper may change on a year-by-year basis to suit the students enrolled in that paper.

			Paper coordinator
S1	GEOL461	Advanced Topics in Geophysics 1	ARG
S1	GEOL462	Advanced Topics in Geochemistry	CEM
S1	GEOL463	Advanced Topics in Paleobiology and Evolution	REF
S1	GEOL464	Advanced Topics in Igneous Processes	JDLW
S1	GEOL465	Advanced Topics in Structural Geology	SAFS
S2	GEOL471	Advanced Topics in Geophysics 2	CO
S2	GEOL472	Advanced Topics in Environmental Geochemistry	JMS
S2	GEOL473	Advanced Topics in Paleoceanography and Paleoclimatology	CMM
S2	GEOL474	Advanced Topics in Metamorphism and Mineralisation	JMS
S2	GEOL475	Advanced Topics in Rock Deformation	VT

A description of papers can be found here: http://www.otago.ac.nz/geology/study/papers/#400level

Other Opportunities

Training in specific techniques is provided for things that will help students with their research project. Use of some facilities (e.g. SEM) require attendance at the appropriate short course and the relevant health and safety induction course.

GEOL401 ADVANCED METHODS IN GEOSCIENCE

"*Contemporary views and important recent advances in geoscience. Advanced methods and techniques in field- and laboratory-based geoscience research including research planning, scientific writing and presentation of findings.*"

Aside from some scattered sessions in each semester, there are few scheduled meeting times for GEOL401 during either semester. This reflects that much of the work associated with the paper is self-directed. The goal of this paper is to provide you with a thorough understanding of topics that may be important to know but not taught in the optional classes. Several informal lectures will be scheduled through the two semesters, mainly to explain in detail the requirements for each of the assessments outlined in the table below.

GEOL401 deadlines in 2019:

Piece of assessment	GEOL401 weighting	Deadline
Research proposal draft	10%	Wednesday 6th March, 5 pm
Research proposal final	25%	Friday 15th March, 12 noon
Field seminar	20%	TBC - early in semester 1
Seminar portfolio semester 1	10%	Friday 31st May, 12 noon
Research talk	10%	Friday 16th August, all day
Seminar portfolio semester 2	25%	Friday 11th October, 12 noon
	100%	
All research projects (see below)		Friday 11th October, 12 noon

Research proposal - You are required to produce a research proposal on your own research topic. The proposal will comprise:

1. A 100 word summary and a graphical abstract;
2. A one-page outline of the project, written to be understandable by a non-specialist, with up to two pages of references;
3. A one page CV;
4. A time plan in the form of a Gantt chart;
5. A list of resources and justification of those resources.

Each element 1 to 5 is explained on the template in **Appendix 1A**. A member of academic staff who is not the supervisor will provide feedback on these components. The stripped down first submission (**Appendix 1A)** is **worth 10%** and the final (second) research proposal is **worth 25%.**

Field seminar - The class will take several staff on a 2 or 3-day fieldtrip early in semester 1. Students will be split into groups and each assigned specific field localities/themes of a staff-selected area. Each group will research a field stop and lead the field discussion. Each group will be required to prepare:

1. a large poster,
2. a 2-page handout, and
3. two publications that everyone should read before going in to field.

They will have to research the area, organize their presentations, and deliver content in a way that stimulates discussion of the rocks and processes. At the outcrop, each group will provide a c. 10 min introduction to the outcrop and theme using a poster. Assessed: **worth 20%.**

Current topics in geosciences portfolios - Students are required to attend (at least) 14 research talks (7 in each semester) from those offered by the Geology Department and other departments. At least two each semester should be in departments other than geology. You need to summarise the

content of talks attended and then make notes about the implications of that research. For each talk you should make:

a. Lecture notes (hand written with sketches best);
b. Bulleted list of key points of the talk;
c. A glossary of new words/ terms etc and their meaning;
d. Bulleted list of follow up ideas/ actions and how these could be followed up. (you might not have this for all talks)

These notes will be collected and assessed as two separate portfolios. The first submission, **worth 10%**, will get feedback on the process**.** The second portfolio (on second set of talks) is **worth 25%.**

Departmental talk **-** The final piece of assessment in GEOL401 is a 10 minute (PGDipSci, MSc) or 15 minute (Hons) talk to the department. You should summarize your research to date and the conclusions you have made (480/490), as well as purpose of research, background and directions for the future (in the case of 495). It is timed so that you can receive feedback on your research well before it is due. The talk will be marked by attending staff members and is **worth 10%.**

GEOL490 / GEOL480/ GEOL495

Deadline for all research projects to be submitted on Blackboard (detailed instructions will follow nearer the time): **Friday 11th October at 12 noon**

Postgraduate research projects provide students with the opportunity to make significant scholastic contributions. Many of our student projects end up as published papers in various scholarly bodies of work. The scope of individual research projects varies, but success in your research will almost always involve developing good lines of communication with your supervisor(s) and other critical personnel (technicians, fellow students, landowners). The **three research papers** offered are:

- **GEOL490 – BSc Honours dissertation** – **60 Points.** A specific aim of the Bachelor of Science with Honours (BSc(Hons)) project is to develop advanced theoretical and research skills and in so doing to provide a platform for an advanced professional or academic career. It provides entry to the PhD programme, pending marks.

- **GEOL480 – Postgraduate Diploma in Science Research project** – **40 Points.** The PGDipSci is a one-year programme that builds on an undergraduate science degree. The diploma encompasses both papers and a research topic, and can be taken full-time or part-time. It provides entry to the Master of Science (MSc) degree by thesis only.

- **GEOL495 – Master of Science Thesis preparation document** – **40 Points.** The MSc is a two-year degree that encompasses both coursework and research. The first year involves mainly coursework and preliminary research preparation. Students will have the opportunity to contribute to existing fields of research, or to begin to develop new areas. The PhD programme can be entered upon completion, pending marks.

Workload expectations of the research project

The University has set expectations regarding the number of hours of work required to complete a degree. These will vary from person to person depending on the project undertaken and the skills and interests applied. However, as a guideline, a project should comprise:

GEOL490	*days*	*total hrs (@8 hrs/day)*	*total pts (@ 12 hrs/pt)*
Literature review	**15**	120	
Field and laboratory work	**35**	280	
Analysis and write-up	**40**	320	
Total	**90**	**720**	**60**

The purpose of an Honours dissertation is to report the results of a targeted research project. The project needs a literature review that explains the background and rationale for the project. The field and laboratory work forms a major component that should take up a sizeable portion of the overall work. The final document needs to be a succinct summary of data and interpretation.

GEOL480	*days*	*total hrs (@8 hrs/day)*	*total pts (@ 12 hrs/pt)*
Literature review	**15**	120	
Field and laboratory work	**15**	120	
Analysis and write-up	**30**	240	
Total	**60**	**480**	**40**

Similarly, the final PGDipSci project should report the findings of a focused research topic. The literature review needs to be thorough, but the degree of field and laboratory work should not be as extensive as an honours thesis.

GEOL 495	*days*	*total hrs (@8 hrs/day)*	*total pts (@ 12 hrs/pt)*
Literature review	**35**	280	
Field and laboratory work	**10**	80	
Analysis and write-up	**15**	120	
Total	**60**	**480**	**40**

A MSc preparation document is very different to an Honours or PGDipSci project. The most important aspect is to demonstrate an extremely thorough understanding of the geological background and all analytical methods and data collection techniques you anticipate using in the following year (which is the main research year). For example, this might involve explaining the theory of how seismic data is acquired, the method that you will use to collect the data, and the method you will use for processing it. If you are doing that work offshore of Dunedin, then you need a synthesis of the geology of the area and what is already known about the offshore rocks. Any of your own data that you have collected during this year should be reported and discussed, and it is important to have gathered at least a small amount in the year.

Formatting of research document

Length: there is no fixed length. In any case, good reports will be succinctly written and well illustrated. You are trying to convey complex research to an audience – so think of the project like a paper (or a novel) – it will have a beginning, middle and end.

Formatting: there is no prescribed format, but everything (including drafts) MUST be spell-checked. Double spacing or 1.5 spacing makes text easier to read.

Citation style: be consistent. We recommend using the New Zealand Journal of Geology and Geophysics scheme. If you are not using EndNote, BibTex or something similar by this stage, start now! There are automatic libraries included with such packages that will format your citations appropriately.

Numbers, **quantities, units**: in general write out numbers up to ten (e.g., seven rocks were analysed) unless you are using units (e.g., 7 km) or referring to time (e.g., 7 weeks). Always leave a space between quantities and units (e.g., 5.3 ms) with the exception of degrees or percentages (e.g. 8°C, 45°S, 99%). Do not allow the space between quantities and units to break across a line break (there are ways to force a non-breaking space in all word processing packages. Units must be presented in S.I.

Figures and tables: should be embedded in text. All figures should be numbered sequentially and require a descriptive caption that stands alone on its own merit. Figures must be cited in the text in a consistent fashion and numbering must be in the order that the figures appear in the text. Use a template such as NZJGG to determine how to format your figures. Figure captions go below figures; table captions go above tables.

Appendices: can be used for extensive data sets and reference material but do not make the mistake of burying key data in the appendices. For example micro-chemical data may be presented as summary graphs with some example full analyses in the text - with the table of all analyses in the appendix.

MARKING DESCRIPTORS ARE AT THE END OF THIS DOCUMENT.

POSSIBLE LAYOUT FOR A 400 LEVEL RESEARCH PROJECT

Abstract - The reader needs to know what is the issue you are addressing, what did you do to solve the problem, what the results are. Avoid waffling on about the field area, rock descriptions, previous work, etc. Generally, 1-2 sentences per chapter will be appropriate. No more than 1 page.

Introduction – The idea here is to convey to the reader, simply and effectively, what the study is about (imagine the reader as being completely unfamiliar with the topic). Think: What's the problem I'm addressing, and why? It can be useful to explain what the specific aims of the project are:

1) To test a specific hypothesis, to establish the extent of XY unit and describe units, to use the data to build an integrated model on the origin of…. etc

Background – A thorough literature review on topic area is compulsory for a good project. Work from big picture towards the local scale. For a tectonics-type project you might work from the national scale to regional scale to local scale: i.e., terranes, units, local geology. Include diagrams to convey key concepts. Inclusion of diagrams is an effective method of breaking-up dry text. Google scholar, searches within Elsevier, Scopus, etc means that there is no excuse for missing key references.

First main aspect of project - Have a short introduction that explains what this chapter is about. If you have investigated geological units, this is where they should be described. Make sure that if you describe an interesting feature, then you include a photograph of it! **1 picture tells 1000 words**. Make pictures easy to see (i.e., at least half a page width and label salient features) and with appropriate captions that enable the reader to understand what the salient point of the diagram is.

Second main aspect of project - If you have described units and petrography already, it is time to go down to the next level. This might be microprobe analyses, or SEM images, or geochemistry, etc. Have a short introduction that explains what this chapter is about. Try to tie it to the previous chapter. "In Chapter 3 it was shown that …." Think of ways to convey large amounts of data simply. Tables are excellent. But keep screeds of data to an appendix – it is not useful in a chapter.

Discussion - Don't add new data in the conclusions or discussion. Discuss answers to questions laid out at beginning. Keep conclusions brief, as there is no need to discuss at length aspects already talked about. The conclusion is where you ram home your key points. 2 pages would be standard.

Appendices - These are where you should include data. Make it accessible - if you have geochemical data it should be printed out. Ensure you have OU numbers for samples that you discuss and will catalogue.

IN ADDITION, FOR A 495 PREPARATION DOCUMENT…

The points mentioned above are equally important for a 495 report. However, a few further specific considerations are listed here.

Abstract – should summarise the research problem, the state of the project (preliminary results), and also note future plans.

Introduction – is expected to be longer than a PGDipSci or Hons and with multiple subsections. Narrowing down of scope to get to the fundamental research questions that will be addressed in the MSc thesis at the end of this section.

- Articulation of the big picture research problem and why it is important.
- A concise summary of what's been done so far to address the problem.

- Discuss your tools and/or study area and how they will be used to address this gap in understanding.
- Very clear articulation of research questions/ objectives that will be addressed by the MSc.

It would be important to clearly justify specifics on your particular core, outcrop, study area, etc.

Methods – Field, engineering, and analytical methods carried out so far.

Results – Discuss the results of this year's work, including fieldwork, equipment building, on-going monitoring, analytical results, etc. as they apply to the project.

Discussion – will likely be limited and restricted to early findings and implications for addressing overall research questions in the following year. Should include a work plan for Year 2 of the MSc outlining what will be done to complete the project and what methods will be used to get there. Be as specific as possible and include sample numbers, resolution, etc. Outline the time that it will take to complete remaining work, write-up results, and submit MSc thesis. A graphic of this timeline should be included.

Summary and future work plan – Summary of findings and next steps. It is critical to provide a comprehensive work plan for the next stages in the project. This is rated highly by the markers.

Other Opportunities

Some of you may need training in topics or techniques that are not included in any formal teaching structure. This is often the case for the use of research facilities for your project. We offer a series of short courses to help students out. These courses do not accrue credit but may be of significant value for project work. Some will be organised in advance. Others will be organised on an ad hoc basis.

APPENDIX 1A: 401 RESEARCH PROPOSAL TEMPLATE

1a. Title of research proposal:
The title of your proposal should be descriptive, in plain English, and no more than 25 words in length: this statement is twenty-five words long.

1b. Identification:

Name of student: your full name here
Contact email: your email address here

Name of principal supervisor: their name here

Name of other staff (within and outside the geology department) who provide help

- Name their name here
- Name their name here
- Name their name here
- Name their name here

1c. Fields of research:
Please enter up to three 6-digit codes, using codes that are as specific as possible. For a list of codes please refer to the "Fields of Research Classification Codes" calculator available at: http://www.royalsociety.org.nz/programmes/funds/marsden/application/codes/.
An example is given below.
040312 Structural Geology

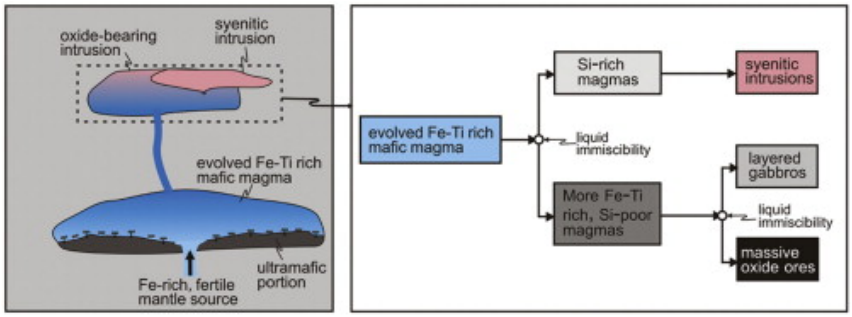
Give key words or key phrases of no more than 255 characters (including spaces) in total, in a single list separated by commas. E.g.: *Fault Zones, Mylonites, Microstructure, Rock Deformation, Deformation Mechanisms, Ice Microstructure, Rheology, Seismicity, EBSD*

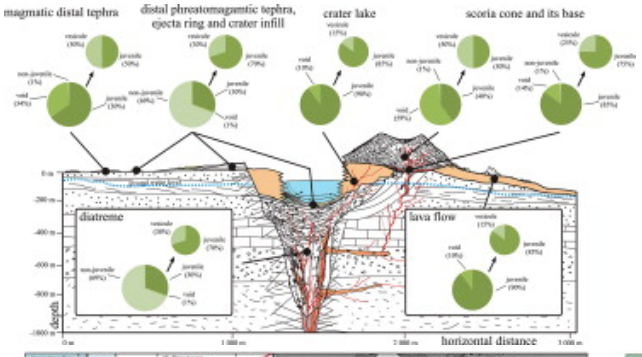
1d. Summary:
Please describe **in up to 100 words** the nature of the proposed research. This should be in plain English and should cover the following items: What is the state of the field? What does the applicant want to do? How will the applicant do it? What is the broad outcome expected to be?

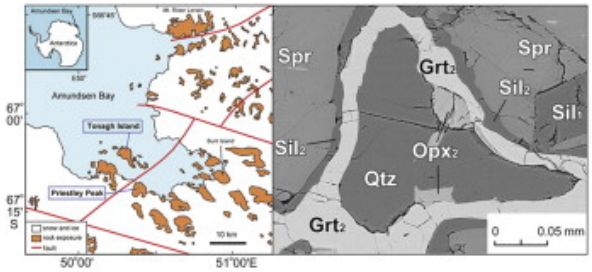
1e. Graphic abstract

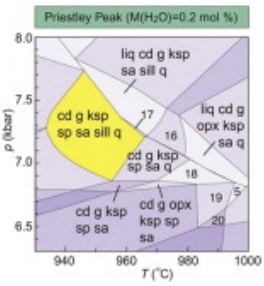
A Graphical Abstract is a **single**, concise, pictorial and visual summary of the main points of your proposal. Include on this page one graphical abstract with a height to width ratio of 2:5. You should also submit your graphical abstract as a separate piece of artwork. Use the instructions at http://www.elsevier.com/journal-authors/graphical-abstract
Bear in mind that the examples on the following page are for papers and yours is for a proposal: a good way to think is that your graphical abstract outlines the hypothesis you wish to test. There are examples at this website and on a number of journal sites accessible through the library website.

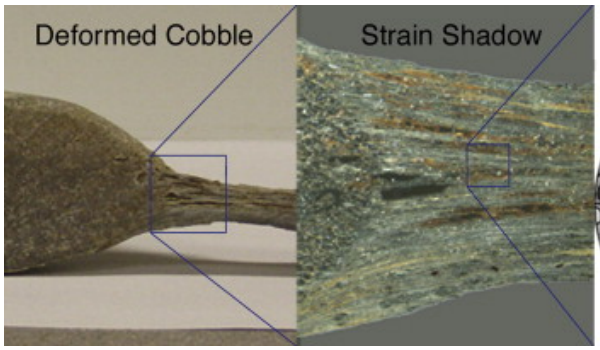
There are several geoscience examples on the next two pages: some are good and some are not

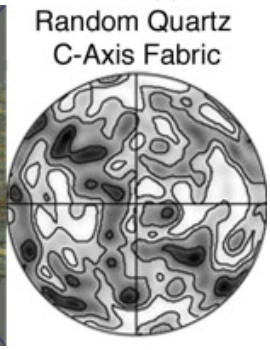






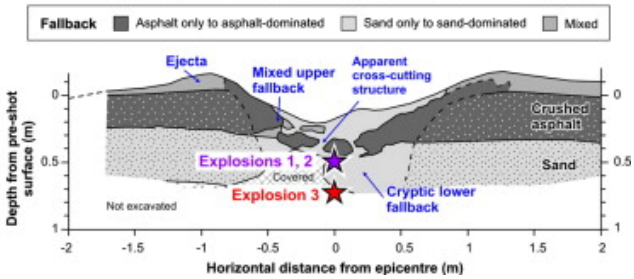




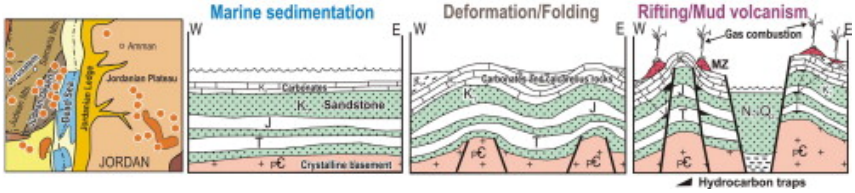


Explosion 3:
150 g charge buried 72 cm below initial surface

Result of three explosions: vertical section in the sub-crater deposits



Mud volcanism in the South Levant related to neotectonics (MZ - Mottled Zone)



2a. Abstract of the research proposal.

Use the instructions for preliminary Marsden Fund proposals (section 2a: abstract of research proposal). Instructions can be found at:
http://www.royalsociety.org.nz/programmes/funds/marsden/application/prelim-guidelines/#introduction

Key issues:

i. It should be understandable by a non-specialist.
ii. The final version is limited to **one page** (see instructions above for full size constraints). This will require you to edit the document many times.

2b. References

As always the references must be cited in the text - in this case section 2a. References not cited should not be included. References are limited to **two pages** total (same font and margin constraints as section 2a). Each reference must include at least three author names (unless there are fewer than 3 authors), the year published, the title of the paper and the journal reference or book details. To be space efficient in section 2a you may need to use superscript numbers to cite references:

The change from fracture-dominated deformation near the Earth's surface to solid-state flow (creep) at depth is commonly known as the brittle-ductile transition (BDT)[1]. The BDT is a fundamental mechanical boundary, corresponding to the peak strength in the Earth's crust[2].

[1] Imber J, Holdsworth RE, Butler CA, Strachan RA 2001. A reappraisal of the Sibson-Scholz fault zone model: The nature of the frictional to viscous ("brittle-ductile") transition along a long-lived, crustal-scale fault, Outer Hebrides, Scotland. Tectonics 20: 601-624.

[2] Kohlstedt DI, Evans B, Mackwell SJ 1995. Strength of the lithosphere: Constraints imposed by laboratory experiments. Journal of Geophysical Research B9: 17587-17602.

3. Curriculum Vitae

Provide a CV of up to **one page** that provides your personal details and your work and educational history. It should be flattering – you are trying to sell yourself!

4. Time plan

Prepare a clear time plan for work completed and work to be completed on your 480/490/495 project. This should be in the form of a Gantt chart.
http://en.wikipedia.org/wiki/Gantt_chart
The chart should **fit on half a page** – ie in the space before the start of section 5.

5. Resources required

Response is limited to the **2/3rd** of a page.

i. List the resources you require for the whole of your 480/490/495 project (ie including what you have already done). You might include resources to complete fieldwork, thin sections, time on instruments (SEM, probe, XRD, laser ICPMS), externally purchased facilities (some geochemical analyses or geochronology) access to software etc. Where relevant include the time (e.g. SEM) or number of samples.
ii. For all major resources provide a brief justification of why it's needed

APPENDIX 1B: **DRAFT** 401 RESEARCH PROPOSAL

This is what is needed and what will be assessed on first submission (10%)

1a. Title of research proposal:

1e. Graphic abstract.

Just a draft version. Hand drawn is fine. Marks will be for effort in putting over the concept of the work.

2a. Abstract of the research proposal.

To help you with this the version you submit as a draft can be up to 2 pages long and does not need references - although you might want to think about where references will be needed. You should have spent significant time editing to get down to 2 pages- as a rule of thumb the two page version will be version >5 (yes that means you have edited/ rewritten it 5 times or more). Marks will be awarded for outlining a science problem, outlining what contribution you hope to make and outlining what you will do.

4. Time plan

Just a draft version. Hand drawn is fine. Marks will be for thinking about timinhg of your research relative to all that other stuff in your life.

Feedback will be given through an individual discussion with the person assessing the draft

Academic Integrity

Honesty and ethical behaviour are cornerstone values of society, at University and beyond. Every member of the University of Otago community is expected to behave ethically and to act with academic integrity. You contribute to the academic integrity of our university in many ways, including:

· Trusting the value of your own intellect
· Undertaking your work honestly and crediting others for their work
· Demonstrating your own achievement
· Accepting corrections as part of the learning process
· Doing original work for each class
· Showcasing your own abilities

Plagiarism is using someone else's words, thoughts, or ideas as if they were your own. The University of Otago considers plagiarism to be dishonest practice. It defines plagiarism as:

> *Copying or paraphrasing another person's work and presenting it as one's own - whether intentionally, or through failure to take proper care. Being party to someone else's plagiarism (by allowing them to copy your work or by otherwise helping them plagiarise work for an assessment) is also dishonest practice.* (University of Otago Plagiarism and Examination Conduct Regulations)

The definition of plagiarism also applies under the following circumstances:

· You help someone else to copy work without acknowledgement
· You let someone else copy your own work
· You use your own work in another situation e.g., a different paper or program without indicating the source

All of these situations are considered a dishonest practice. Any student found responsible for plagiarism in any piece of work submitted for assessment shall be subject to the University's dishonest practices regulations, which may result in various penalties, including forfeiture of marks for the piece of work submitted, a zero grade for the paper, or in extreme cases, exclusion from the University.
(See http://www.otago.ac.nz/study/academicintegrity for more details on Otago's policy.)

If you are ever in doubt about what may be acceptable academic practice with respect to assessment, please discuss your concerns with a staff member before you submit your work.

Appendix: GEOL 490 project marking

%	Description
A+ **90-100**	**Outstanding work.** • Displays an exceptional degree of originality and creativity and/or exceptional analytical and problem-solving skills. • Shows critical understanding of topic, current knowledge and strong evidence of broad reading/research. • Methodology completely appropriate and potential pitfalls understood and noted. • Professional presentation. Images appropriate and the text polished. • With guidance from the supervisor, the work could be converted to a publication without additional data collection.*
A **80-89**	**Very good work.** • Displays originality and creativity and/or the ability to suggest realistic solutions to problems. • Perceptive, focused treatment of issues presented in a critical and scholarly way. Evidence of reading/research outside the material presented, although not necessarily comprehensive. • Methodology employed is accurate and appropriate, with some pitfalls recognised. • Good presentation. Typing errors minimal. Figures generally appropriate but some could be better. Layout appropriate but could be slightly better. • Publication of material will require additional data collection + minor further analysis.
B **65-79**	**Adequate to good work.** • Shows a competent knowledge and understanding of the subject, with little or no major gaps or omissions. • Arguments are clear, generally competently structured, and mostly logical. Displays some originality of thought, and some evidence of reading/research outside the material presented in the programme. • The methodology or arguments employed are largely accurate, although misunderstanding may be present (but unrecognised by the student). • Grammatical errors may be common. Some figures un-informative Layout may not be appropriate. • Work would significant data collection and analysis to become publishable.
C **50-64**	**Unsatisfactory work** (pass). • Limited depth and breadth of general knowledge and understanding of the subject. Arguments/answers are likely to be deficient in structure. There are likely to be errors and omissions and the evidence provided to support arguments will be very limited. • The methodology employed will contain flaws. The work displays obvious deficiencies and omissions. • Little or no evidence of any reading/research outside the material presented in the programme. • Dissertation has flaws in grammar, structure and presentation.
< 50	**Fail** • Knowledge and understanding of the subject are fragmentary, with a very basic level of understanding but other aspects displaying fundamental errors and omissions. • No evidence of any reading/research outside the material presented in the programme. • Dissertation is broadly deficient with many inadequacies of science, structure and presentation and is obviously incomplete.

* This does not mean that it is publishable in its current layout.

GEOL 480 project marking

%	Description
A+ **90-100**	**Outstanding work.** • Displays an exceptional degree of originality and creativity and/or exceptional analytical and problem-solving skills. • Shows critical understanding of topic, current knowledge and strong evidence of broad reading/research. • Methodology completely appropriate and potential pitfalls understood and noted. • Professional presentation. Images appropriate and the text polished. • With guidance from the supervisor, the work could be converted to an international publication without additional data collection.*
A **80-89**	**Very good work.** • Displays originality and creativity and/or the ability to suggest realistic solutions to problems. • Perceptive, focused treatment of issues presented in a critical and scholarly way. Evidence of reading/research outside the material presented, although not necessarily comprehensive. • Methodology employed is accurate and appropriate, with some pitfalls recognised. • Good presentation. Typing errors minimal. Figures generally appropriate but some could be better. Layout appropriate but could be slightly better. • With guidance from the supervisor, publication of material may require additional data collection + minor further analysis.
B **65-79**	**Adequate to good work.** • Shows a competent knowledge and understanding of the subject, with little or no major gaps or omissions. • Arguments are clear, generally competently structured, and mostly logical. Displays some originality of thought, and some evidence of reading/research outside the material presented in the programme. • The methodology or arguments employed are largely accurate, although misunderstanding may be present (but unrecognised by the student). • Grammatical errors may be common. Some figures un-informative Layout may not be appropriate. • Work would require moderate to significant data collection and analysis to be publishable.
C **50-64**	**Unsatisfactory work** (pass). • Limited depth and breadth of general knowledge and understanding of the subject. Arguments/answers are likely to be deficient in structure. There are likely to be errors and omissions and the evidence provided to support arguments will be very limited. • The methodology employed will contain flaws. The work displays obvious deficiencies and omissions. • Little or no evidence of any reading/research outside the material presented in the programme. • Dissertation has flaws in grammar, structure and presentation. • Work is unpublishable.
< 50	**Fail** • Knowledge and understanding of the subject are fragmentary, with a very basic level of understanding but other aspects displaying fundamental errors and omissions. • No evidence of any reading/research outside the material presented in the programme. • Dissertation is broadly deficient with many inadequacies of science, structure and presentation and is obviously incomplete.

* This does not mean that it is publishable in its current layout.

GEOL 495 project marking

%	Description
A+ **90-100**	**Outstanding work.** • Displays an exceptional degree of understanding of topic, including strengths and weaknesses of methods, and potential solutions to the research problem. • Abundant evidence of broad reading/research, with sections outlining the methods clearly considering more than the standard textbook description. • Abundant evidence for data collection and analysis of this data in a robust and scholarly fashion. • Professional presentation. Images appropriate and the is text polished. • Very careful future work plan is included. • Will likely lead to an excellent MSc that is driven by the student (rather than the supervisor).
A **80-89**	**Very good work.** • Perceptive, focused treatment of issues presented in a critical and scholarly way. Evidence of reading/research outside the material presented, although not necessarily comprehensive. • Methodology employed is appropriate and accurate, with some pitfalls discussed. • Significant work undertaken but it may not yet be fully interpreted. • A work plan is included but it is not comprehensive. • Good presentation. Typing errors minimal. Figures generally appropriate but some could be better. Layout appropriate but could be slightly better. • Will likely lead to a good to very good MSc. Some guidance from the supervisor necessary.
B **65-79**	**Adequate to good work.** • Shows a competent knowledge and understanding of the subject, with little or no major gaps or omissions. Displays some originality of thought, and some evidence of reading/research outside the material presented in the programme. • The methodology or arguments employed are largely accurate, although misunderstanding may be present (but unrecognised by the student). • Some analytical work undertaken, but some is not interpreted yet to the degree expected. More analyses should've been done. • Grammatical errors may be common. Some figures un-informative. Layout may not be appropriate. • Will require a lot of effort to convert it to a good MSc. Guidance from the supervisor will be needed.
C **50-64**	**Unsatisfactory work** (pass). • Limited depth and breadth of general knowledge and understanding of the subject. • The methodology employed will contain flaws. The understanding of the methodology is limited and there are obvious deficiencies and omissions. • Data collection is minimal. Interpretation limited. There are errors and obvious omissions. • Little or no evidence of any reading/research outside the material presented in the programme. • No future work plan. • Numerous flaws in grammar, structure and presentation. • Will require effort to convert it to a moderate MSc. Strong guidance from the supervisor will be needed.
< 50	**Fail** • Knowledge and understanding of the subject are fragmentary, with a very basic level of understanding but other aspects displaying fundamental errors and omissions. Virtually no evidence of any reading/research outside the material presented in the programme. • Little analysis of data undertaken, and no interpretation of that data. • Inadequacies in presentation: typing mistakes, sentences incomplete, figures inappropriate. • The supervisor will clearly need to guide the student through virtually all steps of the process to get a MSc out of the project. **Award a PGDipSci**.