Geol 422 Geochemistry, Petrology, Volcanology. (2017)

This paper runs a full year, and incorporates a short course on applied geochemistry presented by CRL. The objectives of the paper are to provide background and practical experience in the paper topics. You will investigate a volcanic succession with the aim of developing and supporting an interpretation of the origin, evolution, transport and eruption of magma from a volcanic centre forming part of the Dunedin Volcanic Complex. Seminars and external reading will support analysis of the information you will acquire during practical work, and be assessed in integrated reports. In the CRL short course will cover practical aspects of mining waste focusing on the geochemistry of acid rock drainage and heavy metals in the environment including soils and water, and in the Ore Geochemistry module you will develop critical reading skills while gaining background in the use of geochemistry to determine the origin of and exploration for various types of hydrothermal mineral deposits.

Assessment weighting will be 50% Volcanology & Petrology, 50% applied geochemistry (the CRL short course plus the Ore Geochemistry module).

The paper begins with 6 weeks on Ore Geochemistry led by Mike Palin. Assessment will be a problem set, to be handed in on 28th April (end of week 8) and worth 25%.

For Petrology and Volcanology there will be a one-day mandatory field trip near the middle of semester 1. You will analyse thin sections of samples from that trip, read relevant publications, and submit a report presenting field and petrography results in support of a petrological interpretation at or before the end of week 13, 2nd June; it is worth 15%. Note that CRL takes place during the…?

The CRL short course will be given in July, with an assessment (TBA) worth 25% on 31st July.

Volcanological analysis of the sample suite from the field trip will be the focus of the final part of the paper, and each one of you will give a presentation on a topic (8%) and then an individual report that integrates all information to interpret the evolution of the Dunedin Volcano (from source to surface); it will be marked (20%) and peer reviewed (7%) by other students (each students will review another student’s report, and will be marked on the review).

This is a 20 point paper, so the expected workload is 240 hours. That equates to 60 hours, or 10 hours per week, for the 6 weeks of Ore Geochemistry, and 120 hours at 10 hours/week for the 12 weeks of Petrology and Volcanology. Note that class meetings occupy only 1-2 hours per week, so 8+ hrs/week should be spent with the required readings and applied work. The remaining 60 hours are allotted for the CRL short course.

Reading requirements:

Weeks 1-6 (Ore Geochemistry)
Weeks 7-13 (Petrology emphasis)
Weeks 14-15 (Volcanology emphasis)
Weeks 16 & 17, CRL short course
Weeks 18-20; no Geol 422 [jdlw away]
Weeks 21-23; (Volcanology emphasis)
Week 24; no Geol 422 – 480/490/495 due
Weeks 25-26; no Geol 422
Assigned readings:

Block 1 [JMP]

Bickle, MJ, and McKenzie, D (1987) The transport of heat and matter by fluids during metamorphism: Contributions to Mineralogy and Petrology 95: 384-392. (skim over equation derivation – concentrate on Fig. 6)


**Blocks 2 & 3 combined [MB & JDLW]**


**Block 2 [MB]**


**Block 3 [JDLW]**