

GEOSCIENCES 214: PETROLOGY SPRING 2010

Instructor: Mary Keskinen (Reich 340 - X 7769 - mjkeskinen@alaska.edu)

Teaching assistants: Kurt Yuengling (Reich 147 - X 7933) &

Brain Perttu (Reich 303 - X7933) & TTA: Peter Illig

Class meetings: Lecture Monday & Wednesday, 11:45-12:45 (Reich 235)

Lab Monday/Wednesday, 2:15-5:

p.m. or 6-9 p.m. (Reich 237)

MK Office Hours: Tuesday 10-11 a.m.; Thursday 2-3 p.m.

LECTURES

READING ASSIGNMENTS

| | | | |
|-------------------|----|--|----------------------------------|
| January | 25 | Structure and composition of the earth, general characteristics of igneous rocks | Blatt, pp.xvii-10, 136-149. |
| | 27 | Mineralogical classification of igneous rocks | Blatt, 20-64. |
| February | 1 | Field characteristics of igneous rocks | Blatt, 10-18, 71-90. |
| | 3 | Phase rule and phase diagrams | Blatt, 92-103. |
| | 8 | Binary systems & fractional crystallization | Blatt, 116-120. |
| | 10 | Ternary systems & Bowen's Reaction Series | Blatt, 103-115. |
| | 15 | Dealing with a more complex system: the real world | Blatt, 120-135. |
| | 17 | Chemical classification of igneous rocks | Blatt, 65-69, 465-470. 22 |
| | | Basalts, tectonics, and ophiolites | Blatt, 151-167. |
| | 24 | Continental volcanism | Blatt, 190-211. |
| March | 1 | Subduction and volcanism | Blatt, 168-180. |
| | 3 | Granites and batholiths | Blatt, 180-189. |
| ** SPRING BREAK * | | | |
| | 15 | The Best Bits of Igneous Rocks | |
| | 17 | Metamorphic Processes | Blatt, 359-379. 22 Igneous |
| | | Petrology Exam | |
| | 24 | Facies and Facies Series | Blatt, 339-357, Miyashiro 19-31. |
| | 29 | Graphical Methods for Metamorphism | Blatt, 381-394; Best 401-408. |
| | 31 | -as above- | |
| April | 5 | Metamorphic Reactions | Blatt, 396-409. |
| | 7 | Quantitative Metamorphic Petrology | Blatt, 471-480. |
| | 12 | Contact Metamorphism and Low P/T Facies Series | Blatt, 439-440, 447-462. |
| | 14 | Regional Metamorphism: Mod P/T Facies Series | Blatt, 411-425, 427-439. |
| | 19 | -as above- | |
| | 21 | High P/T Facies Series: Blueschists & Eclogites | Blatt, 440-444. |
| | 26 | Ocean-floor and Geothermal Metamorphism | |
| | 28 | Isotopes & Trace Elements in Metamorphic Systems | Blatt, 482-497. |
| May | 3 | Petrotectonics | Hyndman, 657-664. |
| | 5 | Review and Overview of Metamorphism | |

FINAL EXAM: Wednesday, May 12 - 10:15-12:15

READING ASSIGNMENTS MUST BE COMPLETED BEFORE THE CLASS FOR WHICH THEY ARE ASSIGNED!

GRADING: The course is divided into two units: the first section dealing with igneous rocks, then metamorphic rocks will be covered. The homework assignments and lecture exams will constitute about 60% of your final grade. The laboratory grade is worth approximately 40% of the final grade. Letter grades and +/- grades will be given.

REQUIRED TEXTBOOK:

Blatt, Tracy, & Owens (2006) Petrology (3rd Ed.) W.H. Freeman and Co., New York.

TEXTS FOR SUPPLEMENTARY READING ASSIGNMENTS:

Best, M.G. (1982) Igneous and Metamorphic Petrology. W.H. Freeman, San Francisco.

Hyndman, D.W. (1985) Petrology of Igneous and Metamorphic Rocks. McGraw-Hill, N.Y.

Miyashiro, A. (1972) Metamorphism and Metamorphic Belts. John Wiley, New York.

Assigned reading from books other than Blatt, Tracy, & Owens will be xeroxed and made available in the classroom (235).

LAB SCHEDULE FOR IGNEOUS AND METAMORPHIC ROCKS

| | | | | |
|----------|----|--|----|----------|
| January | 25 | Review of Optical Mineralogy | | |
| | 27 | Minerals in Thin Section | | |
| February | 1 | Igneous minerals and textures | | |
| | 3 | Igneous minerals and the microscope | | |
| | 8 | M&M lab exercise, thin section preparation and the electron microprobe | 10 | Plutonic |
| | | rocks I | | |
| | 15 | Plutonic rocks and microscopes I | | |
| | 17 | Plutonic rocks II | | |
| | 22 | Plutonic rocks and microscopes II | | |
| | 24 | Volcanic rocks in hand specimen | | |
| March | 1 | Volcanic rocks and microscopes | | |
| | 3 | Pyroclastic rocks and volcano movie | | |
| | | ** SPRING BREAK ** | | |
| | 15 | Unusual igneous rocks in hand sample and thin section | | |
| | 17 | -no lab- | | |
| | 22 | Metamorphic Minerals | | |
| | 24 | Regional Metamorphic Rocks I - pelitic & carbonate rocks | | |
| | 29 | Regional Metamorphic Rocks I - microscopic features | | |
| | 31 | Regional Metamorphic Rocks II - mafic & ultramafic rocks | | |
| April | 5 | Regional Metamorphic Rocks II - microscopic features | | |
| | 7 | Contact Metamorphism and Unfoliated Metamorphic Rocks | | |
| | 12 | -as above- | | |
| | 14 | Metamorphic Facies | | |
| | 19 | -as above- | | |
| | 21 | Igneous, sedimentary, and metamorphic rocks | | |
| | 26 | Field Trip | | |
| | 28 | Igneous and Metamorphic Rock Lab Exam | | |

COURSE DESCRIPTION:

Petrology and Petrography (Geosciences 214) covers the origin, occurrence, and classification of igneous and metamorphic rocks. The format involves 2 hours of lecture per week, largely devoted to more theoretical aspects of these topics, while laboratory work (6 hours per week) involves hand lens identification and thin section examination of representative igneous and metamorphic rocks.

Disability Services: The Office of Disability Services implements the Americans with Disabilities Act (ADA) and insures that UAF students have equal access to the campus and course materials. This class will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities. Make sure to let the instructor know if there are concerns of this type.