UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE
WINTER 2016

1. **Course:** Geology 433, Metamorphic Petrology

   Lecture Sections:

   L01: MoWeFr, 9:00-9:50, ICT 114
   For a listing of all lab sections corresponding with this course, please see the following link:
   http://geoscience.ucalgary.ca/geoscience_info/courses/w16

   Instructor, Dr. David Pattison, Office: ES 154, Tel. No. 403-220-3263, e-mail address, pattison@ucalgary.ca,
   Office Hours: by appointment

   Geoscience Department ES 118, 403-220-5841, geoscience.ucalgary.ca, geoscience@ucalgary.ca

2. **Prerequisites:** Geology 431. See section 3.5.C in the Faculty of Science section of the online Calendar (www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

   Antirequisites: Credit for no more than one of Geology 433, 443, 533, will be allowed.

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Labs (10)	15%	
Combined Lab/Lec Midterm	30%	(Th Feb. 25, 2016)
Final Lab Examination	25%	(Th Apr. 7, 2016)
Final Lecture Examination	30%	(To be scheduled by the Registrar)

To pass the course, it is necessary to get an aggregate percentage score on the three exams of 50.00% or over.

Labs are graded using a two-stage 0-1-2 scale that will be explained in more detail in the labs. The aggregate lab results will then be converted to a single percentage score. Each exam will be assigned a percentage score. The student's average percentage score for the four components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade. The conversion between course percentage and letter grade is given below; the Instructor may uniformly lower (but not raise) the numerical cutoffs for the different letter grades depending on a number of factors (difficulty of exams, how hard the marking is, etc.).

The conversion between course percentage and letter grade is given below.

Letter Grade	Percent
A+	>88.00
A	82.00-87.99
A-	79.00-81.99
B+	76.00-78.99
B	72.00-75.99
B-	69.00-71.99
C+	66.00-68.99
C	62.00-65.99
C-	59.00-61.99
D+	56.00-58.99
D	50.00-55.99
F	<50

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize himself/herself with these regulations. See also Section E.6 of the University Calendar.

5. **Course Materials:**
Textbook: John D. Winter. *Principles of Igneous and Metamorphic Petrology.(Second Edition)* Prentice Hall, Inc., Upper Saddle River, New Jersey. 702 p.

The Instructor will use material from outside the textbook to enhance student understanding.

6. **Examination Policy**: No electronic aids (eg. cell phones, tablets, computers, PDAs) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Other materials permitted or required for exams will be communicated orally and in writing (email) well in advance of the exam. Students should also read the Calendar, Section G, on Examinations.

7. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also Section E.2 of the University Calendar.

8. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

(a) Academic Misconduct: (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties.

(b) Assembly Points: In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

(c) Student Accommodations: Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Geoscience, Dr. E.S. Krebes by email krebes@ucalgary.ca or phone 403-220-5850.

(d) Safewalk: Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) Freedom of Information and Privacy: This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also http://www.ucalgary.ca/secretariat/privacy.

(f) Student Union Information: VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403-220-6420 Email: ombuds@ucalgary.ca; http://ucalgary.ca/provost/students/ombuds

(g) Internet and Electronic Device Information: You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(h) U.S.R.I.: At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI Surveys.

Department Approval ORIGINAL SIGNED Date December 18, 2015

Tentative Lecture-Laboratory-Tutorial Schedule
GLGY 433 Metamorphic Petrology – Winter 2016

Week	Lecture MWF	Topic	Lab Th
1	Jan 11	Introduction and course logistics/objectives.	1. Metamorphic textures and structures
	Jan 13	Metamorphic textures and structures 1.	
	Jan 15	Metamorphic textures and structures 2.	
2	Jan 18	Bulk composition: projections, triangular diags, phase rule.	2. Chemographic diagrams, bulk compositions, mineral assemblages, grids, AFM movies, isograds
	Jan 20	Metapelites 1. Bulk comp, AFM diagrams, petrogen grid.	
	Jan 22	Metapelites 2. Phase diag sections. Uses of phase diags.	
3	Jan 25	Metapelites 3. Barrovian 1 (greenschist-amphibolite).	3. Metapelites 1 (Barrovian low to high grade)
	Jan 27	Metapelites 4. Barrovian 2 (partial melting)	
	Jan 29	Metapelites 5. Barrovian 3 (upper amphib-granulite)	
4	Feb 1	Metapelites 6. Buchan 1 (greenschist-amphibolite).	4. Metapelites 2 (bathozones and Buchan met'm)
	Feb 3	Metapelites 7. Buchan 2. Bathozones/bathograds.	
	Feb 5	Case study of Barr/Buch met'm.	
5	Feb 8	Thermo 1. Mineral equilibria.	5. Geothermobarometry
	Feb 10	Thermo 2. Thermobarometry.	
	Feb 12	Thermo 3. Multi-equilibrium thermob.	
6	Feb 15	***No lectures – Reading Week***	***No labs – Reading Week***
	Feb 17		
	Feb 19		
7	Feb 22	TBA	**Lab-lec midterm**
	Feb 24	TBA	
	Feb 26	Bailey-Tilley lecture.	
8	Feb 29	Metabasites 1.	6. Metabasites (subgreenschist-granulite)
	Mar 2	Metabasites 2.	
	Mar 4	Metabasites 3.	
9	Mar 7	Marbles and calcsilicates. Fluids.	7. Marbles, calcsilicates and fluids
	Mar 9	Marbles and calcsilicates. Fluids.	
	Mar 11	Other fluids (amph/gran). Climate and CO2 sequestration.	
10	Mar 14	Met'm of other bulk comps.	8. Quartzites, metamorphosed altered rocks, metamorphosed banded iron formation
	Mar 16	Met'm of other bulk comps.	
	Mar 18	Blueschists and eclogites.	
11	Mar 21	Blueschists and eclogites.	9. Blueschists, eclogites, UHP and UHT met'm
	Mar 23	UHP. UHT.	
	Mar 25	***No lecture – Good Friday***	
12	Mar 28	Equil'm & kinetics in met'm.	10. Reaction rates, thermal modelling of metamorphism, thermochronology
	Mar 30	Rates of metamorphic processes. Kinetics.	
	Apr 1	Dating metamorphism (accessory phase petrol).	
13	Apr 4	Granites/migmatites – extraction & emplacement of magma	**LAB FINAL**
	Apr 6	Metamorphism and geodynamics.	
	Apr 8	Metamorphism and geodynamics.	
14	Apr 11	Metamorphism and geodynamics.	
	Apr 13	Metm through time. ***End of course.***	
	Apr 15		