UNIVERSITY OF CALGARY
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE

1. Course: GEOLOGY 443 – IGNEOUS AND METAMORPHIC PETROLOGY

Lecture Section:	L01	MWF	10:00-10:50	ES 162	WINTER 2014

Instructor(s):	Dr. D. Pattison	ES 154	220-3263	pattison@ucalgary.ca
	Dr. R.K. Sasidharan Nair	ES 152	220-4823	rnair@ucalgary.ca

D2L Course: GLGY 443 L01 https://d2l.ucalgary.ca

Geoscience Department ES 118; (403) 220-5841; www.geoscience.ucalgary.ca

2. PREREQUISITE(S): Geology 323, 337 and 423

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

3. **GRADING**: The University policy on grading and related matters is described in "Academic Regulations, sections F.1 and F.2" of the online University Calendar (**http://www.ucalgary.ca/pubs/calendar/current/f-1.html** and **http://www.ucalgary.ca/pubs/calendar/current/f-2.html**) In determining the overall grade in the course the following weights will be used:

Part 1: Igneous		**Part 2: Metamorphic**	
Lab Assignments (5)	10%	Lab Assignments (5)	10%
Tutorials (4)	4%	Tutorials (4)	4%
Lab exam	20%	Lab-lec exam	20%
Lec exam Feb. 28 18:00 – 20:00 ICT 121 & ICT 122	16%	Lec exam (Registrar)	16%
Total (Igneous)	**50%**	**Total (Metamorphic)**	**50%**

Each piece of work (laboratory report, tutorial, examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course. The final letter grade for the course will be assigned consultatively by Drs. Nair and Pattison at the end of the course, based on the total numerical aggregate (out of 100%) of the above components. **To pass the course, your aggregate percentage score on the exams (Igneous and Metamorphic combined) must be greater than 50%**.

The two parts of the course are formally separate (although concepts and skills learned from Part 1 of the course will be used in Part 2 of the course). The two lab-lec exams will involve examination of minerals, rocks and thin sections. They will be open book exams. The two lec exams will consist of a combination of short and long-answer questions, and no aids will be allowed.

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: **http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html**. It is the student's responsibility to familiarize himself/herself with these regulations. See also **http://www.ucalgary.ca/pubs/calendar/current/e-3.html**.

5. Dates and times of class exercises held outside of class hours Feb 28 18:00 – 20:00 ICT 121 & 122

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

Department Approval: ORGINAL SIGNED Date: December 13 2013

Associate Dean's Approval for
out of regular class-time activity: ORIGINAL SIGNED Date: January 14 2014

6. **EXAMINATION POLICY**: No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of the lecture exams, although non-programmable calculators will be permitted to answer quantitative questions on lecture exams, if applicable; permission to do this will be clearly indicated on the examination paper. For lab exams, they are 100% open book.

   Students should also read the Calendar, Section G, on Examinations: **http://www.ucalgary.ca/pubs/calendar/current/g.html**.

7. 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 **http://www.ucalgary.ca/pubs/calendar/current/e-2.html**

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 K. Student Misconduct (**http://www.ucalgary.ca/pubs/calendar/current/k.html**) 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 at http://www.ucalgary.ca/emergencyplan/assemblypoints.

(c) ACADEMIC ACCOMMODATION POLICY. Students with documentable disabilities are referred to the following links:
Calendar entry on students with disabilities: **http://www.ucalgary.ca/pubs/calendar/current/b-1.html**
Student Accessibility Services: www.ucalgary.ca/access

(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**: 220-3911 **Email**: suvpaca@ucagary.ca.
SU Faculty Rep. **Phone:** 220-3913 **Email:** sciencerep@su.ucalgary.ca Website **http://www.su.ucalgary.ca/home/contact.html**.
Student Ombudsman: www.ucalgary.ca/provost/students/ombuds; ombuds@ucalgary.ca 220-6420

(g) INTERNET and ELECTRONIC COMMUNICATION DEVICE Information. You can assume that in all classes that you attend, **your cell phone should be turned off**. 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.

UNIVERSITY OF CALGARY
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE

GEOLOGY 443
IGNEOUS AND METAMORPHIC PETROLOGY

TERM:	Winter 2014			
PREREQUISITE(S):	Geology 323, 337 and 423			
LECTURER(S):	Dr. D. Pattison	ES 154	220-3263	pattison@ucalgary.ca
	Dr. R.K. Sasidharan Nair	ES 152	220-4823	rnair@ucalgary.ca

LECTURE :	L01	MWF	10:00-10:50	ES 162
LABS:	B01, 02, 03	T	08:00, 11:00, 14:00	EEEL 147
	B04, 05, 06	R	08:00, 11:00, 14:00	EEEL 147
	B07	T	17:00	EEEL 147
	B08	R	17:00	EEEL 147
TUTORIALS:	T01-T08	W	09:00, 12:00, 13:00, 14:00, 15:00, 16:00 11:00, 08:00	EEEL 147

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

Materials from outside the textbook will be used regularly to enhance the lecture topics and the learning process. ***If you do not attend the lectures you will miss essential course material.*** Anything covered during the lecture may appear on the exams.

1. MARK DISTRIBUTION: In determining the overall grade in the course the following weights will be used:

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Typical letter grade conversions from previous years are listed below, but the Instructors reserve the right to make modifications based on how hard the TAs mark, how hard the exams are, etc.:

<50 = F; 50-53 = D; 54-56 = D+; 57-59 = C-; 60-63 = C; 64-66 = C+;
67-69 = B-; 70-73 = B; 74-76 = B+; 77-79 = A-; 80-87 = A; 88-100 = A+.

Students who are absent from a laboratory or lecture examination because of illness or other unforeseen circumstances may be granted an excused absence by the Instructor upon presentation of adequate documentation (a completed Physician/Counsellor Report form <http://www.ucalgary.ca/registrar/PDFs/physcoun.pdf> for illness; equivalent documentation for other circumstances). There will be no "make-up" examinations for excused absences. The weight assigned to the missed examination will be transferred to the other examinations.

Similarly, students who are unable to submit laboratory reports or assignments on time because of similar circumstances will be required to submit the same type of documentation to the TA or Instructor in order to be considered for a time extension.

GLGY443 Winter 2014 Tentative Lec-Lab-Tutorial-Exam Schedule

Week	Date M/W/F	Lec. No.	TOPIC	LABS	Tutorial
1	6-Jan		***No class***	**No lab**	**No Tutorial**
	8-Jan	1	Course introduction and logistics; Igneous introduction.		
	10-Jan	2	Melting and magma generaton within the Earth		
2	13-Jan	3	Classification and textures	1. Igneous textures.	**No Tutorial**
	15-Jan	4	Classification and textures		
	17-Jan	5	Physical properties of magma		
3	20-Jan	6	Phase equilibria: Intro, binary systems	2. Basalt and diabase.	1. CIPW norm calculation.
	22-Jan	7	Phase equilibria: binary systems.		
	24-Jan	8	Phase equilibria: ternary systems.		
4	27-Jan	9	Magma Differentiation	3.Layered mafic intrusions.	2. Stokes Law and eruption rates.
	29-Jan	10	Chemical petrology: major elements.		
	31-Jan	11	Chemical petrology: trace elements		
5	3-Feb	12	Chemical petrology: isotopes.	4. Calc-alkaline volcanic rocks.	3. Variation diagrams
	5-Feb	13	Layered Mafic Intrusions		
	7-Feb	14	Basalts: MORB		
6	10-Feb	15	Basalt: OIB	5. Calc-alkaline intrusive rocks	4. Isotope geochemistry
	12-Feb	16	Continental flood basalts; Large Igneous Provinces		
	14-Feb	17	Convergent margin magmatism: island arcs.		
7	17-Feb		***No lecture - Reading Week***	**No lab**	**No Tutorial**
	19-Feb		***No lecture - Reading Week***		
	21-Feb		***No lecture - Reading Week***		
8	24-Feb	18	Convergent margin magmatism: continental arcs.	**LAB EXAM IGNEOUS**	**No Tutorial**
	26-Feb	19	Granitoid Rocks		
	28-Feb	20	Out of class Midterm Exam		
			---------- End of Igneous, Start of Metamorphic ----------		
9	3-Mar	21	Metamorphic introduction. Met'c textures and structures.	6. Metamorphic textures and structures	5. Projections
	5-Mar	22	Mineral assemblages 1: projections and bulk comp's.		
	7-Mar	23	Met'c textures/structures 2		
10	10-Mar	24	Metapelites 1: bulk comp, projections, isograds, reactions.	7. Metapelites	6. Bulk comp, *P*-*T* and mineral assemblages
	12-Mar	25	Metapelites 2: linking AFM diagrams & petrogenetic grid.		
	14-Mar	26	Metapelites 3: Phase diagram sections.		
11	17-Mar	27	Metabasites 1: bulk comp, projections, isograds.	8. Metabasites	7. Geothermo-barometry (Grt-Bt & GASP)
	19-Mar	28	Geothermobarometry.		
	21-Mar	29	Metabasites 2.		
12	24-Mar	30	Marbles and calcsilicates 1.	9. Marbles and calcsilicates	**No Tutorial**
	26-Mar	31	Marbles and calcsilicates 2.		
	28-Mar	32	Blueschists .		
13	31-Mar	33	Eclogites.	10. Blueschists and eclogites	8. Calculate rates of reaction
	2-Apr	34	Rates of metamorphic processes.		
	4-Apr	35	High grade metamorphism, migmatites, granites 1.		
14	7-Apr	36	High grade metamorphism, migmatites, granites 2.	**LAB EXAM METAMORPHIC**	**No Tutorial**
	9-Apr	37	Metamorphic facies, P-T-t evolution.		
	11-Apr	38	Metamorphism and geodynamics.		
15	14-Apr	39	Review - metamorphism.		
	16-Apr		***No class***		
	18-Apr		***No class***		
			EXAM SCHEDULE	**Location**	
	28-Feb	Friday	Lecture Exam 1	TBA	
	TBA	TBA	Lecture Exam 2 (scheduled by Registrar)	TBA	