



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE
WINTER 2015

1. **Course:** Geology 583, Advanced Carbonate Sedimentology

Lecture Sections:

L01: TuTh, 11:00-12:15, EEEL 349

Labs: MoWe 17:00-20:00 Room TBD

Instructor, Dr. B. Beauchamp, Office ES 146, Tel. No. 403-220-8266, e-mail address, bbeaucha@ucalgary.ca,
Office Hours: MoTuWeThFr 13:30-14:30

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

2. **Prerequisites:** Geology 461 and 491. 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)

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:

Composition of Final Grade

Quiz 1	10%
Quiz 2	10%
Quiz 3	10%
Quiz 4	10%
Laboratory Report 1	25%
Laboratory Report 2	25%
Comprehension Quiz	10%

Grading Scheme

A+	95 – 100%
A	86 – 94%
A-	80 – 85%
B+	77 – 79%
B	73 – 76%
B-	70 – 72%
C+	67 – 69%
C	63 – 66%
C-	60 – 62%
D+	55 – 59%
D	50 – 54%
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:

Suggested (not required) textbooks:

Flügel, Microfacies Analysis of Carbonate Rocks, 2nd ed.

N.P. James, and R.W. Dalrymple, R.W. eds., Facies Models 4, GEOText 6, Geological Association of Canada

McIlreath and Morrow, 1990 (Eds). Diagenesis. Geoscience Canada, Reprint Series 4.

6. Examination Policy:

No aids will be allowed during in-class examinations (Quiz 1 to 4 and Comprehension Quiz).

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) **Misconduct:** 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) **Academic Accommodation Policy:** Students with documentable disabilities are referred to the following links: Students with Disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html> [B.1](#) and Student Accessibility Services: <http://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 (FOIP). 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@ucalgary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; [Student Ombudsman](#)

(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: Signed Original

Date: December 19, 2014

Associate Dean's Approval for

Alternate final examination arrangements: Signed Original

Date: December 22, 2014

GLGY 583 Course and Lab Schedule

W	Labs Monday & Wednesday	Lecture Tuesday	Lecture Thursday
1	Jan 12/14 2015 No lab	Jan 13 2015 Course Introduction <ul style="list-style-type: none"> • Course info • Review of previous courses • Review of topic to be covered in this course 	Jan 15 2015 Constituents and Classifications of Carbonate Rocks, Carbonate Facies Analysis and Facies Models <ul style="list-style-type: none"> • Fossils • Grains • Lime mud • Cements • Aragonite vs calcite • Classifications • Differences between clastic and carbonate facies analysis • Response to sea level fluctuations • Microfacies analysis • Standard model
2	Jan 19/21 2015 Microfacies Project	Jan 20 2015 Chemistry of Calcium Carbonate <ul style="list-style-type: none"> • Aquatic carbonate system • CaCO_3 equilibrium • pH buffering • CO_2 degassing • Silicate weathering • Earth system / rock cycle • Mineralogy • Chemistry (Mg/Ca; Sr; Fe; etc.) 	Jan 22 2015 Carbonate Factories through Time <ul style="list-style-type: none"> • Sun radiation • Latitudinal range of carbonate deposition • Photoc zone • Nutrients • Carbonate factories • Carbonate-forming fossils in time • Aragonite vs calcite seas
3	Jan 26/28 2015 Microfacies Project	Jan 27 2015 Warm Water Reef_Modern <ul style="list-style-type: none"> • Biological processes • Barrier reefs • Atolls • Classification • Modern examples • Reef bleaching 	Jan 29 2015 Warm Water Reef_Ancient <ul style="list-style-type: none"> • Biological processes • Deep oligophotic vs framework reef • Classification • Reef types and distribution • Ancient examples
4	Feb 02/04 2015 Microfacies Project	Feb 03 2015 Quiz 1 Carbonate Slope_Modern and Ancient <ul style="list-style-type: none"> • Stratal pattern • Slopes • Processes • Deposits • Modern examples • Ancient examples 	Feb 05 2015 Shelf and Lagoon_Modern and Ancient <ul style="list-style-type: none"> • Biological processes • Energy settings • Salinity restriction • Teepee, fenestral fabric • Sea grass • Modern examples • Ancient examples
5	Feb 09/11 2015 Microfacies Project	Feb 10 2015 Peritidal and lacustrine carbonates <ul style="list-style-type: none"> • Tidal Flats • Beaches • Eolianites • Lacustrine carbonates • Case history: <ul style="list-style-type: none"> ◦ Mount James: Lake or tidal flat? 	Feb 12 2015 Tunisia's carbonate systems and petroleum development <i>Guest: Makram Hedhli</i>
6	Feb 16/18 2015 No lab	Feb 17 2015 No class	Feb 19 2015 No class
7	Feb 23/25 2015 Microfacies Project	Feb 24 2015 Case History <ul style="list-style-type: none"> • Swan Hills 1 	Feb 26 2015 Case History <ul style="list-style-type: none"> • Swan Hills 2

		<i>Guest: Dr Christian Viau</i>	<i>Guest: Dr Christian Viau</i>
8	Mar 02/04 2015 LAB REPORT 01 IS DUE TODAY Core Project	Mar 03 2015 Quiz 2 Cool-water Carbonates_Modern <ul style="list-style-type: none"> • Thermocline • Latitudinal distribution • Linkage to oceanography • Open ramp models • Heterozoan biota 	Mar 05 2015 Cool-water Carbonates_Ancient <ul style="list-style-type: none"> • Heterozoan carbonates in space and time • Clastic-like systems • Polar carbonates • Ancient examples
9	Mar 09/11 2015 Core Project	Mar 10 2015 Mud Factory <ul style="list-style-type: none"> • In situ factories • Whitings • Microbial carbonates • Bioerosion • Mud mounds 	Mar 12 2015 Oceanic carbonates <ul style="list-style-type: none"> • Principles of oeanography <ul style="list-style-type: none"> ◦ Atmospheric cells ◦ Wind patterns ◦ Upwelling ◦ CCD. acidification ◦ Carbon pump • Pelagic carbonates <ul style="list-style-type: none"> ◦ Planktonic foraminifers ◦ Coccoliths, chalk
10	Mar 16/18 2015 Core Project	Mar 17 2015 Methane seep carbonates <ul style="list-style-type: none"> • Modern setting • Ancient examples <ul style="list-style-type: none"> ◦ Arctic examples 	Mar 19 2015 Quiz 3 Carbonate Diagenesis <ul style="list-style-type: none"> • Introduction • Recrystallization • Neomorphism • Dissolution • Type of porosity • Types of cements • Paragenetic sequence • Analytical tools and isotopes
11	Mar 23/25 2015 Core Project	Mar 24 2015 Submarine Diagenesis <ul style="list-style-type: none"> • Submarine diagenetic zones • Cement types • Water pumping • Beachrock • Sea floor fans 	Mar 26 2015 Meteoric diagenesis I <ul style="list-style-type: none"> • Dissolution • Precipitation • Role of CO₂ • Soil • Caliche profiles • Carbonate-rich soil profiles • Recognizing subaerial unconformities in carbonate cycles • <i>Microcodium</i>
12	Mar 30/Apr 01 2015 Core Project	Mar 31 2015 Meteoric diagenesis II <ul style="list-style-type: none"> • Karsts and caves • Vadose cementation • Phreatic cementation • Mixing zone 	Apr 02 2015 Burial diagenesis <ul style="list-style-type: none"> • Compaction / stylolites • Syntaxial overgrowth • Sparry calcite • P-T gradients
13	Apr 06/08 2015 Core Project	Apr 07 2015 Dolomite I <ul style="list-style-type: none"> • Dolomite problem • Processes • Models • Hydrothermal 	Apr 09 2015 Dolomite II Geochemistry and Origin of Diagenetic Fluids in Paleozoic Carbonates in SW Ontario <i>Guest: Omid Haeri Ardakani</i>
14	Apr 13/15 2014	Apr 14 2015 Quiz 4 Comprehension Quiz LAB REPORT 02 IS DUE TODAY	Apr 16 2015 No class