UNIVERSITY OF CALGARY
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE (January 08 2014 version)

1. Course: GEOLOGY 583 – ADVANCED CARBONATE SEDIMENTOLOGY

Lecture Section:	L01	TR	11:00-12:15	SS 117	WINTER 2014

Instructor(s):	Dr. B. Beauchamp	ES 146	220-8266	bbeaucha@ucalgary.ca

Course name: Advanced Carbonate Sedimentology

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

2. PREREQUISITE(S): Geology 461 and 491

ANTIREQUISITE(S): Credit for both Geology 595 and 694 will not be allowed.

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:

Quiz (5 @ 8%)	40%
Laboratory Report 1	25%
Laboratory Report 2	25%
Comprehension Quiz	10%

"Each piece of work (assignment, laboratory report, midterm test or final 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, which will be used to determine the course letter grade

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: None scheduled

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: January 07 2014

6. **EXAMINATION POLICY**: No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) 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.

   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 the research paper and summaries of papers to read 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.

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DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE

GEOLOGY 583
ADVANCED CARBONATE SEDIMENTOLOGY

TERM: Winter 2014

PREREQUISITE(S): Geology 461 and 491

LECTURER(S): Dr. B. Beauchamp ES 146 220-8266 bbeaucha@ucalgary.ca

LECTURE :	L01	TR	11:00-12:15	SS	117
LAB(S):	B01	M	17:00	ES	147

TEXT-BOOK: 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.

MARK DISTRIBUTION:

A. Composition of Final Grade

Quiz	
Quiz 1	8%
Quiz 2	8%
Quiz 3	8%
Quiz 4	8%
Quiz 5	8%
Laboratory Report 1	25%
Laboratory Report 2	25%
Comprehension Quiz	10%

C. Components of Course for Which a Passing Grade is Essential
None

D. 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%

TENTATIVE LECTURE SCHEDULE

W	Monday	Tuesday	Thursday
1	Jan 06 2014 **No lab**	Jan 07 2014 **No lecture**	Jan 09 2014 **Course Introduction** • Course info • Review of previous courses
2	Jan 13 2014 **Microfacies Project**	Jan 14 2014 **Constituents and Classifications of Carbonate Rocks** • Fossils • Grains • Lime mud • Cements • Aragonite vs calcite • Classifications **Introduction to Carbonate Facies Analysis and Facies Models** • Differences between clastic and carbonate facies analysis • Response to sea level fluctuations • Microfacies analysis	Jan 16 2014 **Chemistry of Calcium Carbonate** • Aquatic carbonate system • $CaCO_3$ equilibrium • pH buffering • CO_2 degassing • Silicate weathering • Earth system / rock cycle • Mineralogy • Chemistry (Mg/Ca; Sr; Fe; etc.) • Acidification
3	Jan 20 2014 **Microfacies Project**	Jan 21 2014 **Carbonate Factories through Time** • Sun radiation • Latitudinal range of carbonate deposition • Photic zone • Nutrients • Carbonate factories • Carbonate-forming fossils in time • Aragonite vs calcite seas	Jan 23 2014 **Warm Water Reef_Modern** • Biological processes • Barrier reefs • Atolls • Classification • Modern examples • Reef bleaching
4	Jan 27 2014 **Microfacies Project**	Jan 28 2014 **Quiz 1** **Warm Water Reef_Ancient** • Biological processes • Deep oligophotic vs framework reef • Classification • Reef types and distribution • Ancient examples	Jan 30 2014 **Carbonate Slope_Modern and Ancient** • Stratal pattern • Slopes • Processes • Deposits • Modern examples • Ancient examples
5	Feb 03 2014 **Microfacies Project**	Feb 04 2014 **Shelf and Lagoon_Modern and Ancient** • Biological processes • Energy settings • Salinity restriction • Teepee, fenestral fabric • Sea grass • Modern examples • Ancient examples	Feb 06 2014 **Cool-water Carbonates_Modern** • Thermocline • Latitudinal distribution • Linkage to oceanography • Open ramp models • Heterozoan biota
6	Feb 10 2014 **Microfacies Project**	Feb 11 2014 **Quiz 2** **Cool-water Carbonates_Ancient** • Heterozoan carbonates in space and time • Clastic-like systems • Polar carbonates • Ancient examples	Feb 13 2014 **Methane seep carbonates** • Modern setting • Ancient examples o Arctic examples • *Guest: Krista Williscroft*

7	Feb 17 2014 **No lab**	Feb 18 2014 **No class**	Feb 20 2014 **No class**
8	Feb 24 2014 **Report production**	Feb 25 2014 **Case History** • Swan Hills 1 • *Guest: Dr Christian Viau*	Feb 27 2014 **Case History** • Swan Hills 2 • *Guest: Dr Christian Viau*
9	Mar 03 2014 **LAB REPORT 01 IS DUE TODAY** **Core Project**	Mar 04 2014 **Case History** • Lower Paleozoic, Arctic Canada • *Guest: Dr Keith Dewing*	Mar 06 2014 **Mud Factory** • In situ factories • Whitings • Microbial carbonates • Bioerosion • Mud mounds
10	Mar 10 2014 **Core Project**	Mar 11 2014 **Quiz 3** **Peritidal carbonates** • Tidal Flats • Beaches • Eolianites	Mar 13 2014 **Oceanic carbonates** • Principles of oeanography o Atmospheric cells o Wind patterns o Upwelling o CCD. acidification o Carbon pump • Pelagic carbonates o Planktonic foraminifers o Coccoliths, chalk
11	Mar 17 2014 **Core Project**	Mar 18 2014 **Carbonate Diagenesis** • Introduction • Recrystallization • Neomorphism • Dissolution • Type of porosity • Types of cements • Paragenetic sequence • Analytical tools and isotopes	Mar 20 2014 **Submarine Diagenesis** • Submarine diagenetic zones • Cement types • Water pumping • Beachrock • Sea floor fans
12	Mar 24 2014 **Core Project**	Mar 25 2014 **Quiz 4** **Meteoric diagenesis** • Dissolution • Precipitation • Role of CO_2 • Vadose cementation • Phreatic cementation • Karsts and caves	Mar 27 2014 **Case History** • Carbonate-rich soil profiles • Caliches • *Microcodium* *Guest: Dr Pavel Kabanov*
13	Mar 31 2014 **Core Project**	Apr 01 2014 **Burial diagenesis** • Compaction / stylolites • Syntaxial overgrowth • Sparry calcite • P-T gradients	Apr 03 2014 **Dolomite** • Dolomite problem • Processes • Models • Hydrothermal
14	Apr 07 2014 **Report production**	Apr 08 2014 **Carbonate plays of WCSB** • Past discoveries • Current and future prospects • Unconventional carbonate plays • *Guest: Dr Ian McIlreath*	Apr 10 2014 **Quiz 5** **Comprehension Quiz**
15	Apr 14 2014 **LAB REPORT 02 IS DUE TODAY** **No lab**	Apr 15 2014 **No class**	Apr 17 2014 **No class**