

Marine Geology
GLY 5736/GLY4930
Fall 2015

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362 Williamson Hall
Office Hours: M,W 4:00-5:00, or by appointment

Class: MWF, 3rd (10:40-11:30), 210 Williamson Hall

Guest lecturers: Mike Perfit (mperfit@ufl.edu), John Jaeger (jmjaeger@ufl.edu), Nadrea Dutton (adutton@ufl.edu) and Liz Sreaton (sreaton@ufl.edu), have all kindly agreed to lecture on topics related to their areas of expertise.

Objectives: Marine Geology is a very broad topic that essentially encompasses all studies of the character and history of the part of the earth within the oceans. To highlight its relevance, that means it is concerned with the geology of approximately three-quarters of the surface of earth today, and an even larger fraction of the earth's surface at times in the past. The diversity of topics that fall within Marine Geology cover processes occurring in the atmosphere to the core, shallow to deep water, and within igneous and sedimentary domains. The plan for this course is to first build the ocean basins, which couples tectonic evolution with igneous petrology. Then we will add seawater and study the flow patterns that are critical to nutrient distributions, sediment patterns and climate. Next we will add the sediments and discuss methods for dating these materials, as well as alteration by fluids. We will end the course by looking at the history of oceanography that is preserved in the marine sedimentary record.

Because Marine Geology covers a diverse array of topics, I am not an expert on much of the material we will be discussing. For some topics other faculty members will cover their areas of expertise, for others we will need to work through the material together; many of you have expertise in areas that will be covered in the course and your input will be valuable and appreciated.

Required Texts:

The Ocean Basins: Their Structure and Evolution, 1998, (Second Edition), Open University Course Team, Butterworth-Heinemann, 184pp.

Marine Biogeochemical Cycles, 2005, (Second Edition) Open University Course Team, Butterworth-Heinemann, 130pp. (This is out of print apparently, but it is still available at Amazon)

The Open University books are essentially textbooks that provide details about the basic information we will cover in the course. I will supplement these texts with additional readings, but most of the additional reading will be for class discussions.

Course Plan: The course is going to be composed of a mixture of standard lectures, group learning, literature discussions, and student presentations. I think everyone learns

best when they are responsible for some of the learning and when they teach concepts to others; therefore, you will all be responsible for helping me teach some of the material.

Discussions: You will be graded on your preparation and participation in discussions of current literature.

Exams: There will be two exams. Each will focus on the material presented in the preceding classes and consist of ~5 short essay questions.

Problem Sets: There are 4 problem sets due over the semester.

Dating Techniques: A critical aspect of studying Marine Geology is the ability to date sediments and rocks. You will each work with a partner to present the details of a dating method to the class.

Review Papers: Each student will pick a current idea, controversy, or debate in Marine Geology- something that goes beyond the material presented in the course. You will then write an 8 page (1.5 spacing) review paper on the concept and present it to the class.

Evaluations and reviews: As a scientist, it is important to learn to critically evaluate scientific ideas and presentations. Therefore, everyone will contribute to the evaluation process. Each of you will be responsible for filling out *constructive* evaluations for each presentation (including comments and feedback for the presenter).

Grading:

Problem sets	15%
Participation in discussions (0-3 rating)	10%
First exam (Oct. 12)	20%
Dating Presentation and exercise	5%
Review paper and class presentation	25% (15%/10%)
Evaluations	5%
Second Exam (Dec. 18, or negotiable)	20%

Website: There is an e-learning (Canvas) site for this course that includes the syllabus, reading assignments, messages, and copies of my Powerpoint presentations. My intention is to have lecture material posted by 6:00 the night before class.

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Date	General Topic	Readings
Aug. 24	Introduction and Overview	OB Ch 1 (Intro)
Aug. 26	Ocean Basins and Provinces	OB Ch 2 minus 2.3
Aug. 28	Ocean Basins and Provinces	
Aug. 31	Crust/Lithosphere	OB Ch. 4 Isostasy Prob.
Sept 2	Discussion- <i>Ocean Crust</i>	
Sept. 4	Mid Ocean Ridges (Perfit)	OB sec 2.3, Perfit, 2001
Sept. 7	LABOR DAY	
Sept. 9	Discussion- <i>LIPs and Hotspots</i>	(review paper topics)
Sept.11	Mid Ocean Ridges (Perfit)	Oceanus articles
Sept. 14	Convergent Margins	Keary and Vine (online)
Sept. 16	Convergent Margins	
Sept. 18	Passive Margins	OB Ch. 3
Sept. 21	Surface Ocean Circulation	Any intro text/ Seafloor Problem Set
Sept. 23	Ocean Circulation	MBC section 2.4
Sept. 25	Deep Ocean Circulation	
Sept. 28	Ocean Geochemical Cycles	MBC Ch 2.1-2.2; OB Ch. 7
Sept. 30	Ocean Geochemical Cycles	MBC Ch. 2.2-2.6 Ocean Circ Exercise
Oct. 2	Discussion- <i>Ocean Conveyor</i>	
Oct. 5	Marine Sediments	MBC Ch 1; OB sec. 6.1
Oct. 7	Marine Sediments	
Oct. 9	Catch up/ Dating- organization	
Oct. 12	EXAM 1	
Oct. 14	Carbonate Systematics	MBC Ch. 3.1, 4.3.3
Oct. 16	Carbonate Systematics	

Oct. 19	Discussion- <i>Carbonate Systematics</i>	
Oct. 21	Continental Margin Sedimentation (Jaeger)	MBC Ch. 3.
Oct. 23	Continental Margin Sedimentation (Jaeger)	CCD Problems Due

Oct. 26	Discussion- <i>Continental Margin Sedimentation</i>	
Oct. 28	Dating- presentations	
Oct. 30	Dating- presentations	
Nov. 2	Discussion- Sea level (Dutton)	OB 6.2
Nov. 4	1. Early Diagenesis	MBC Ch. 5
Nov. 6	HOME COMING (Nov. 6)	
Nov. 9	2. Early Diagenesis	review paper due
Nov. 11	VETERAN'S DAY (Nov. 11)	
Nov. 13	3. Interstitial Fluids	MBC Ch. 5
Nov. 16	4. Interstitial Fluids	
Nov. 18	Fluid Flow (Screaton)	EOS Article
Nov. 20	Discussion- Deep Biosphere	
Nov. 23	5. Paleooceanography- Goals and Methods	critique due
Nov. 25	Day before Tgiving (Nov 25)	
Nov. 27	THANKSGIVING – (Nov. 27)	
Nov. 30	6. Paleooceanography- Goals and Methods	MBC Ch. 4
Dec. 2	7. Paleooceanography- the Past 100 m.y.	OB Ch. 6
Dec. 4	8. Paleooceanography- Pleistocene	
Dec. 7	9. Paleooceanography	
Dec. 9	Discussion- Paleooceanography	

FINAL- Dec. 18th, 10:00-12:00 (or at a time and day agreed upon by the class)

Red = no class

Blue= Guest Lecturer

OB = The Ocean Basins: Their Structure and Evolution

MBC = Marine Biogeochemical Cycles