Spring 2006

EXPERIMENTAL MARINE ECOLOGY

Biology S32

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Course Description: Experimental hypothesis testing dominants the field of marine ecology and designing and conducting an experiment to test hypotheses is the main goal of this course. Beyond that, this course has two objectives. First, it is designed to introduce you to some of the current hypotheses concerning the relationships between species and their environment, intra and interspecific interactions, and factors structuring communities by examining these topics in coastal communities. Second, some of you will examine the impact of baitworm digging on carbon cycling and benthic communities in depth and learn to present the results of your research orally and in writing. The impact of baitworm digging is selected because of it potentially large impact of intertidal mud and sand flats in Maine and because I am currently conducting research funded though Sea Grant and the Maine Department of Marine Resources addressing the impact of digging at the ecosystem, population, and individual levels of organization. You work will contribute to this research. Some of you will use bivalve growth as bioindicators of climate change in arctic and sub-arctic areas. Arctic climate change is my other area of research. Because the methods to learn the techniques can take longer than short term allows, only those of you with prior experience in this area will be conducting this research.

Field: Fieldwork will be organized around low tide and therefore times will vary. A **tentative schedule** of field work is presented below. You are expected to keep informed of any changes in schedule, which will be made during class and via e-mail to the bulletin board for this class (sbios32a). It will also probably be necessary to conduct field and laboratory work outside of the times listed below. Your projects are independent work and therefore you are expected to conduct a good portion of it independently. Finally, it is important to dress warmly (wool hat, sweater, long pants) for all fieldwork even though it is spring. The water is still cold and you should expect to get wet and you will get muddy. Bring extra clothes to change into.

Class: We will meet on average 1-2 days a week for approximately 1.5 hours a day to discuss literature and your experiments. Class time will be at 0900 unless otherwise arranged.

Lab: A considerable amount of work (data analysis, sample processing, and incubations) will be done in the lab. Not everyone will work on every aspect of the experiment to the same degree and much of this work will be independent. When scheduled, lab will begin at 0900. When lab and class meet on the same day, we will decide when to meet for lab during class. When cores are incubating in the lab, it will be necessary to sample oxygen periodically throughout the night. Sample processing will take place outside of designated class hours and weekend work may be necessary.

Readings: Assigned articles are identified by first author's last name and date in the syllabus and are in the laboratory (Carnegie 444). There are several copies of every article, but it is important that you not keep the articles too long so that everyone has a chance to read them before class. Sign each article out by writing your name, date, and time on the article's folder and crossing your name out when you return the article. Part of class will be a discussion of the articles, so it is important that everyone reads them before class. Regardless of your research topic, you will be expected to read the articles on the syllabus and those selected by students and contribute to class discussion. Each of you will also be expected to contribute an article for class and to lead a discussion of that article.

Grading: The course is graded satisfactory/unsatisfactory. Failure to participate in class and as appropriate field and laboratory activities and present final oral and written presentations will result in an unsatisfactory grade.

Schedule (tentative)

Date	Class/Lab/Field	Reading
WEEK 1		
Monday April 24	Class (0800): Course Introduction Introduction to soft-sediment communities Honours Presentations: **1000 Erika Millstein** **1330: Brian Dupee**	Hall 1994 Ambrose & Bohlen 2005
Tuesday April 25	Class: research plan, discuss articles	Emerson *et al*. 1990 Brown & Wilson 1995 Clough *et al*. 2005
Wednesday April 26	NO CLASS	
Thursday April 27	Class: discuss articles & research plans Field: oxygen sampling-Front Side (Low: 1726) Lab: sample oxygen	Ambrose *et al*. 1998 Beal & Vencile 2001
Friday April 28	Class: **Proposals Due** (5 min. presentation) Lab: analyze data, sieve oxygen cores, analyze pigments	
Saturday April 29	Coastal Flight and aerial photography (2 students) Leave Carnegie: 0530	
WEEK 2		
Monday May 1	Field: Oxygen sampling-Maquoit (Low: 0830) Lab: sample oxygen, mark worms	
Tuesday May 2	Class: discuss articles Lab: analyze data, sieve samples, analyze pigments Field: digging efficiency-distribute worms (Low: 0922)	Castadelli *et al*. 2003 Watling *et al*. 2001
Wednesday May 3	Field: oxygen sampling-Hyler digging efficiency-collect worms (low: 1016) Lab: sample oxygen	

Schedule (continued)

Date	Class/Lab/Field	Reading
Thursday May 4	Class: analyze oxygen data Lab: sieve samples	
Friday May 5	NO CLASS	
WEEK 3		
Monday May 8	Class: student articles (climate change) Field: sampling (Low: 1446)	TBA
Tuesday May 9	Class: student articles (remineralization) Lab: sort samples, data analysis Field: digging efficiency, etc. (Low: 1528)	TBA
Wednesday May 10	Field: digging efficiency, etc. (Low: 1606)	
Thursday May 11	Field/Lab	
Friday May 12	NO CLASS	
WEEK 4		
Monday May 15	Class: preliminary Results: 10 minutes each student student articles (clam burrowing, pigments)	TBA
Tuesday May 16		
Wednesday May 17	Field/Lab (Low: 0844)	
Thursday May 18		
Friday May 19	NO CLASS	

Schedule (continued)

Date	Class/Lab/Field	Reading
WEEK 5		
Monday May 22	Class: Discussion of Presentations	Tufte 2003
Tuesday May 23	Lab: data analysis & interpretation	
Wednesday May 24	**Oral Presentations**	
Thursday May 25	**Final Papers Due**	
Friday May 26	Lab: **clean up**	

Preliminary Reading List

Ambrose, W.G. Jr., M. Dawson, C. Gailey, P. Ledkovsky, S. O'Leary, B. Tassinari, H. Vogel, and C. Wilson. 1998. Effects of Baitworm digging on the soft-shelled clam, *Mya arenaria* in Maine: shell damage and exposure on the sediment surface. *Journal of Shellfish Research*. **17:** 1043-1050

Ambrose, W.G. and C. Bohlen 2005. Frequency, intensity, and ecological consequences of blook worm (Glycera dibranchiate) harvesting on intertidal flats in Maine. Proposal to Maine Sea Grant. 19 pp.

Beal, BF and KW Vencile. 2001. Short term effects of commercial clam (*Mya arenaria*) and worm (*Glycera dibranchiata*) harvesting on the survival and growth of juveniles of the soft-shell clam. *Journal of Shellfish Research*, **20(3):**1145-1157

Brown, B, & WH Wilson. 1997. The role of commercial digging of mudflat as an agent for change of infaunal intertidal populations. *Journal of Experimental Marine Biology and Ecology*, **218:** 49-61.

Castaldelli, G, S Mantovani, DT Welsh, R Rossi, M Mistri & EA Fano. 2003. Impact of commercial clam harvesting on water column and sediment characteristics and macrobenthic community structure in a lagoon of the Po River delta. *Chemistry and Ecology*, **19**: 161-171

Clough, LM, PE Renaud, & WG Ambrose. 2005. Impacts of water depth, sediment pigment concentration, and benthic macrofaunal biomass on sediment oxygen demand in the western Artic Ocean. *Canadian Journal of Fisheries and Aquatic Sciences*, **62**: 1756-1765.

Emerson, CW, J Grant & TW Rowell. 1990. Indirect effects of clam digging on the viability of the soft-shelled clams, *Mya arenaria*. *Netherlands Journal of Sea Research*, **27:** 109-118.

Hall, SJ. 1994. Physical disturbance and marine benthic communities: life in unconsolidated sediments. *Oceanography and Marine Biology: an annual review*, **32**: 179-239

Tufte, E. 2003. *The Cognative Style of Power Point*. Graphics Press, Cheschire

Watling, L, Findlay, RH, Mayer, LM, & Schick DF. 2001. Impact of scallop drag on the sediment chemistry, microbiota, and faunal assemblages of a shallow subtidal marine benthic community.