Syllabus

ESSP 433 - Applied Marine Science Technology

Spring 2002

Instructor:
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Office Hours:
T,Th 12-2:00
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Textbooks:
Mapping Technology Review
Available free at: http://seafloor.csumb.edu

Web Resources:
Coastal Geospatial Information
http://www.csc.noaa.gov/products/datasites
California Marine Habitat Task Force
http:// seafloor.monterey.edu
Ocean Mapping Group @ U. New Brunswick
http://www.omg.unb.ca/omg/
Joint Hydrographic Center, NOAA Special Projects
http://www.ccom-jhc.unh.edu/
NOAA Center for Operational Oceanographic Products and Services
http://co-ops.nos.noaa.gov/
Sea Technology Magazine
www.sea-technology.com
SAIC Magazine
www.saic.com/maritime/magazine.html.
Federal mapping information
http://www.uic.edu/depts/lib/collections/maps/fedinternet.html
National Geodetic Survey Data Sheets
http://www.ngs.noaa.gov/datasheet.html

Prerequisites: ESSP 220 (Physics 1), ESSP 332 (GIS/GPS)
Enrollment limit: 18

CSUMB/ESSP Major Learning Outcomes (MLO): Successful completion of this course fulfills ESSP MLO #7 Group III (Area of concentration) and MLO #8 Group III (Scientific inquiry).

COURSE DESCRIPTION & GOALS:

The purpose of this course will be to help students learn and become proficient in the application of current hydrographic survey techniques to marine habitat mapping. This is a hands-on, project oriented, outcomes-based class in which students will use the CSUMB Seafloor Mapping Lab seafloor mapping system and vessel for survey design, data acquisition, analysis and display. Specific technologies to be covered include sidescan sonar, multibeam bathymetry, hydrographic survey design, ROV, acoustic tracking, motion correction, GIS, GPS and vessel navigation. Students will learn and become proficient in the use of following software packages: Hypack, CARIS HIPS, Triton-Elics Isis, NobelTec, ArcView. This course is ideally suited for supporting or launching individual capstone and thesis projects. **Bring Field Clothes Each Week!**

COURSE LEARNING OUTCOMES

Learning Outcome 1: Research team members will be able to accurately describe the theory of operation and application of sea floor mapping technologies.

Learning Experiences

1. Class lectures, readings, demonstrations, exercises

Learning Assessments

1. Weekly quizzes and/or assignments
2. Informal assessment of performance in the field

Learning outcome 2: Research team members will be able to design a complete and effective acoustic sea floor mapping survey based on specified deliverables.

Learning Experiences

1. Each team member will develop a survey design for a proposed survey site. This design will include a written description, diagrams and related Hypack files. A model RFP (request for proposals will be reviewed and provided as a guide.)

Learning Assessments

1. Survey designs will be assessed for completeness, accuracy and quality.

Learning outcome 3: Team members will be able to operate each of the various hardware and software components of a sea floor mapping system involved in the acquisition, processing, analysis, GIS integration and display of: multibeam, sidescan sonar and ROV data.

Learning Experiences

1. Lab and field experience with the subsystem components.

Learning Assessments

1. Each team member will be assessed on their ability to safely, effectively and efficiently operate the components.

Learning outcome 4: Team members will be able to review and assess the merits of professionally prepared acoustic survey technical report.

Learning Experiences

1. Members will discuss and prepare a written review of a professionally prepared technical report provided as a model.

Learning Assessments

1. The reviews will be assessed based on completeness and technical insight and quality of the written document

Learning outcome 5: Team members will be able to prepare a written technical report for an acoustic survey of professional quality.

Learning Experiences

1. Each research team member will prepare a final technical report on the Elkhorn Slough (or other) project describing the importance, purpose, approach, methods, results, and conclusions.

Learning Assessments

1. Written technical reports will be assessed for completeness, quality, attention to detail, technical mastery, integration of parts, and interpretation of results.

ESSP 433 PRODUCTS & ASSESSMENT

Assessment Breakdown

General understanding of seafloor mapping:		**20 %**
Weekly quizzes & assignments		
Review of Professional Technical Report:		**5 %**
Technical expertise (acquisition, processing, analysis, display):		**60 %**
Survey design (Hypack)	10 %	
Multibeam sonar		
Reson & Triton-Elics Isis (acquisition)	10%	
Caris (processing)	10 %	
Sidescan sonar (Triton-Elics Isis)	10 %	
ROV & video analysis	5 %	
Sediment grain size analysis	5 %	
GIS integration & analysis (ArcView)	10 %	
Written Technical Report (w/GIS project & poster)		**15 %**
TOTAL		**100 %**

GROUND RULES FOR ESSP 433

Will late submissions be accepted? Late submission of any class work for assessment (homework, proposals, reports, profiles) will be devalued 10% for each week that the item is late.

Will incompletes be given for ESSP 433? No incompletes will be given unless there are circumstances beyond the student's control that led to the work not being done in a timely manner.

How are letter grades assigned? ESSP 433 is graded on a straight percentage of 10% for each whole grade. Pluses and minuses are given at the upper and lower ends of each grade range.

A+	98-100%	C+	78-79
A	93-97	C	73-77
A-	90-92	C-	70-72
B+	88-89	D+	68-69
B	83-87	D	63-67
B-	80-82	D-	60-62
		F	<60

How should completed class work be submitted? Wherever possible all written work should be submitted in electronic format for assessment. Email smaller files (< 200K). We are setting up an "in box' on our local server that you will also be able to use, especially for larger files. Include the first 4 letters of your last name in the file name. (e.g. “Smitreport” for Smith’s Technical Report.)

ESSP 433 Class Schedule ()

Date	Topics	Activity, Assignments
1 Feb	Class Intro I	**Class Introductions –** review syllabus **Lecture:** Powerpoint - Acoustic Remote sensing & Marine Habitat Mapping ***Activity****: Tupperware habitat mapping* **Reading assignment #1r** 1) Acoustic Remote sensing & Marine Habitat Mapping 2) Hypack Manual Appendix Chapters: B,C,D
8 Feb	MB Processing CARIS HIPS	**Quiz #1** - on reading assignment #1 & PowerPoint **Lecture:** Introduction to CARIS HIPS & the Delmonte Shale beds site **Processing Assignment #1:** clean lines for Shale beds deep **Reading assignment #2r** – Read HIPS Manual in Acrobat Reader (Chapters:Starting new project, Swath Editor)
15 Feb	HIPS MB processing (cont)	**Quiz #2** - on reading assignment #2 **Lecture:** Review & Expand on HIPS ***Activity****: continue processing shale bed data – subset, Export xyz data from HIPS* **Processing Assignment #2** – produce final geotif of shale bed data
22 Feb	DEM data acquisition	**Lecture:** terrain modeling: data acquisition, contouring, DEM analyses, data density considerations **Field Activity***: Acquire topographic data with GPS and process in GIS* **Processing Assignment #3** – produce contour and shaded relief map of GPS DEM
1 Mar	Habitat interpretation, contouring, GIS project creation	**Lecture:** Creating and groundtruthing habitat maps from multibeam data ***Activity***: *Gridding and contouring in ArcView/Spatial Analyst.* *Habitat interpretation: heads-up digitizing & attributing in ArcView* **Processing Assignment #4** – produce GIS project for shalebeds with: coastline, contours, geotiff and habitat interpretation themes
8 Mar	Groundtruth data acquisition: video, sed grabs **CRUISE**	**Lecture:** Creating and groundtruthing habitat maps from multibeam data ***Field Activity***: **CRUISE** *Groundtruth aboard RV MacGinitie: video survey and sediment sampling*. **Assignment #5** –
15 Mar	Groundtruth data analysis and GIS integration	**Lecture:** Video and grain size analyses: methods and considerations ***Activity***: *sediment grain size analysis with Optisizer, video analysis in SFML video lab.* **Processing Assignment #6** – process one sediment sample, hot link video groundtruth movies to GIS project
22 Mar		**Spring Break**
29 Mar	Multibeam bathymetry survey planning	**Lectures:** A) Multibeam bathymetry theory and application. B) Hydrographic survey design considerations: data density, efficiency, coverage ***Activity****: Use Excel and Hypack to create a cost effective survey design for the class project area* **Processing Assignment #7** – produce contour and shaded relief map
5 Apr	Hydrographic survey **CRUISE**	***Field Activity****:* ***CRUISE*** *Execute planned hydrographic survey aboard R/V MacGinitie to acquire multibeam and sidescan sonar data.* **Processing Assignment #8** – process multibeam data
12 Apr	Sidescan sonar processing	**Lecture:** Sidescan sonar: theory, application, acquisition, processing ***Activity****: Use Isis and Delphmap to process sidescan sonar data from survey* **Processing Assignment #9** – produce sidescan sonar mosaic for survey area and integrate as Geotiff into GIS project

19 Apr	ROV & acoustic tracking	**Lecture:** ROV video data acquisition, navigation and acoustic positioning ***Activity****: Plan and outfit MacGinitie for ROV groundtruth survey of deep shale beds* **Processing Assignment #11** – Review profession technical report
26 Apr	Sidescan sonar data acquisition **CRUISE**	***Field Activity****: **CRUISE** Execute planned sidescan sonar survey aboard R/V MacGinitie to acquire towed EdgeTech sidescan sonar data.* **Processing Assignment #10** – process sidescan data
3 May	ROV data acquisition **CRUISE**	***Field Activity****: **CRUISE** Execute planned sidescan sonar survey aboard R/V MacGinitie to acquire towed EdgeTech sidescan sonar data.* **Processing Assignment #12** – process sidescan data
10 May	GIS project completion	***Activity****: Complete GIS project for all of Delmonte Shale Beds.* **Processing Assignment #13** – GIS project files, written technical report and poster for entire shale bed area
17 May	**Final exam**	5 hr **Practical Exam**
24 May	**Cap Fest**	**Capstone Festival**
3 Jun	**Grades Due**	