

SIO 296 Marine GIS Winter 2015

Instructor:
Heidi Batchelor
hbatchelor@ucsd.edu
MESOM 157
858 534-1732

Office hours:
Monday 4-5, Wednesday 11:30-12:30

Appointments suggested

Course Syllabus

Marine GIS is offered for 4 units, letter grade only.

Course Description:

We will cover the most commonly used marine spatial data with an emphasis on merging physical, biological, and anthropogenic data for decision support. In this introductory course, students will learn the fundamentals of geographic information systems (GIS), including coordinate systems, editing marine geographic and tabular data, spatial data analysis, database creation, and map creation. This course will use the GIS software ArcGIS by ESRI. No prerequisites are required, but students should be very comfortable with Windows.

Goals and Objectives:

Upon completion of the course, students will be familiar with using the different components of ArcGIS, including ArcCatalog, ArcMap, and ArcToolbox for a variety of Marine applications. The student will be able to display, analyze, and store marine spatial data using GIS. Students will learn to create publication-quality maps and communicate results visually for both scientist and non-scientist viewers. They will also learn to create spatial databases and to perform a large number of spatial analysis techniques relevant to Marine Ecology and Planning.

At the end of the quarter, students will independently complete a project of their choice including effective marine spatial data display, creating a spatial database, and performing spatial data analysis.

Students **MUST** have access to a Windows computer. The software doesn't run on Mac or Linux, unless using a virtual or dual-boot windows operating system.

Course Structure

Week 1: Introduction and exploring GIS concepts

- Introduction to the course
- Spatial data display, storage, and management
- GIS software tools

Week 2: Effective communication: Displaying marine spatial data

- Cartography, Nautical charts
- Creating publication-quality maps of the marine environment
- Classifying data for display

Week 3: Creating and sharing a marine spatial database

- Data types and projections commonly used in GIS
- Data tables and joining data attributes
- Basics of the Geodatabase

Week 4: Online GIS for the marine environment

- ArcGIS Online, story maps
- Editing and analyzing spatial data

Week 5: Overlay analysis and geoprocessing tools

- Incorporating tagged-animal data
- Overlay analysis
- Describing and quantifying changes over time

Week 6: Working with rasters: bathymetry and satellite data

- The raster data format
- Interpolation, Contours, hillshades, DEMs and TINs

Week 7: Anthropogenic data topics

- Municipal boundaries
- AIS ship tracks
- Marine protected areas

Week 8: Marine mammal topics

- Density calculations and visualization
- Using metadata databases for data selection
- Describing and quantifying distribution patterns

Week 9: Habitat models

- Weighted overlay using rasters
- Describing habitats based on multiple data layers
- Predictive models

Week 10/11: Project presentations and final exam

Student/Course Requirements:

Weekly Assignments:

Lesson concepts will be reinforced by a weekly homework exercise which will also allow students to develop an expertise using ArcGIS software.

Assignments should be completed on or before the due date. Late work will be accepted up to one week late, with a penalty of a 25% reduction in the assignment grade. Please email the homework assignments to the instructor before the start of class on the due date. Either a pdf or word document is acceptable.

Quizzes and Exams: Throughout the course, there will be weekly online quizzes. Quizzes are intended to be open book and have unlimited attempts - the midterm and final exams are based on the quizzes. There will be one closed-note midterm exam and one closed-note cumulative final exam.

Group presentation:

In groups of 3-5 students, you will give a presentation to the class on your group topic. Sign up for a group the second week of class. Your group presentation should be about 30 minutes long. Plan for between 6 and 10 minutes per person. We will stop your presentation at the 10-minute-per-person mark. Detailed guidelines will be available on the course website.

Individual project:

Each student will complete a GIS project on a topic of their choice. The project must include marine data. Components are described in detail on the course website, including publication quality maps, a marine geodatabase, and spatial data analysis. We will work together throughout the quarter on the individual projects. The project is appropriate for part of a Capstone, Thesis, conference poster or presentation, or peer-reviewed publication.

Course Materials:

Main Course Text Book (Used is fine):

GIS Tutorial 1: Basic Workbook, 10.1 edition (2013 Edition) by Gorr, Wilpen L. & Kirkand, Kristen S. ISBN: 9781589483354

Data: The data disc for the homework is included with the GIS Tutorial book.

Secondary Book (Used is fine)

An Introduction to Using GIS in Marine Biology Workbook Two: working with raster layers. By Colin D. MacLeod. ISBN: 978-0-9568974-2-8

Software

We will use ESRI ArcGIS at the ArcInfo level with full extensions in our course. Version 10.1 or 10.2 are both acceptable for the course. Software can be obtained in many ways.

1. If you buy the main course text book new, a trial software license is included to install on your own Windows computer.
2. The ACS virtual computer lab includes ArcGIS
3. There is a dedicated GIS machine in the CMBC trailer
4. The Geisel library has a GIS computer lab that has the software
5. There are some free student licenses available from the GIS librarian at Geisel.
Please contact the instructor to have access to one of the student licenses.

Again, students **MUST** have access to a Windows computer. The software doesn't run on Mac or Linux, unless using a virtual or dual-boot windows operating system.

Grading System:

Individual Project: 400 points

Homework exercises: 250 points

Group presentation: 150 points

Final Exam: 100 points

Midterm Exam: 100 points

Grades are based on points

Grading scale:

A+ 966 - 1000

A 933 - 965

A- 900 - 932

B+ 866 - 899

B 833 - 865

B- 800 - 832

C+ 766 - 799

C: 733 - 765

C- 700 - 732

D 600 - 699

F: below 600

Most course materials are available online.

Please let the instructor if you need any help navigating the course website. Almost all course materials will be distributed through the website only. Each student is responsible for checking the website frequently, at least twice a week. In Blackboard we will use the following menus:

My Announcements	This is the first page you see upon entering your course. Announcements and reminders will be posted here.
Information	Syllabus will be located here.
Content: Lessons	The instructor's lectures.
Discussion	Questions pertaining to the course should be placed here. You, your classmates, and the instructor can answer any questions posted. This is very helpful for technical questions, especially on the homework. Group sign-ups will be on the discussion board.
Content: Assignments	Homework, quizzes, project information, and other materials are available here.
Contacts	Instructor contact information is listed here.
Tools: MyGrades	Check your grades

How to Access the Course Website

This quarter we will be using the online tool Blackboard. Our website name is **SIO 296 - Batchelor [WI15]**

Please follow these steps in order to access the course.

1. Go to the UCSD ted site <http://ted.ucsd.edu>
2. Your username is your @ucsd.edu email address. For example, my address is hbatchelor@ucsd.edu. My username is hbatchelor
3. Your password is the same as the one you use for your @ucsd.edu address.
4. To access the course, click on the name of our course.