

## **SIO 296 Marine GIS Winter 2016**

Instructor:  
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MESOM 157  
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Office hours as below.  
Fridays 4pm – 5pm MESOM 157 *with appointment*  
Virtual hours Wednesday 5:30pm-7pm

### **Course Syllabus**

Marine GIS is offered for 1-5 units MAS students should register for 3-5 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.

## Course Structure

Week 1-2: Introduction and exploring GIS concepts

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

Week 3: Effective communication: Displaying marine spatial data

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

Week 4: Overlay analysis and geoprocessing tools

- Overlay analysis
- Describing and quantifying changes over time

Week 5: Online GIS for the marine environment

- ArcGIS Online
- Editing and analyzing spatial data

Week 6: Creating and sharing a marine spatial database

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

Week 7: Advanced data formats: netCDF, rasters, bathymetry and satellite data

- The raster data format
- Interpolation and classification
- Data with magnitude and direction
- Contours, hillshades, DEMs and TINs

Week 8: Habitat models

- Density calculations and visualization
- Site suitability models
- Introducing spatial predictive models

Week 9: Marine GIS applications

- Elementary spatial statistics: distribution patterns
- Marine protected areas

Week 10/11: Project presentations and final exam

### **Student/Course Requirements:**

#### Weekly Lab Assignments:

Lesson concepts will be reinforced by a weekly lab exercise which will also allow students to develop an expertise using ArcGIS software. The lab assignment should be mainly completed in class.

All 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.

#### Weekly Homework Assignments:

Weekly homework assignments are due at the beginning of class. These assignments are intended to reinforce the relationship between the student's area of interest and class work. These are intended to be minimally time-intensive, and should take less than 15 minutes to complete.

Exams: One online midterm and one online final exam are part of the course. Exams will be open note.

#### Individual project:

Each student will complete a GIS project on a topic of their choice. The project must include marine spatial 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, but must include the data disc):

*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.

## Software

We will use ESRI ArcGIS at the ArcInfo level with full extensions in our course. Version 10.1 or 10.2 or 10.3 are all acceptable for the course.

The software doesn't run on Mac or Linux, unless using a virtual or dual-boot windows operating system. Using a UCSD computer with the software already installed is perfectly adequate for our course.

Software for homework and the project can be obtained in many ways.

1. If you buy the course text book new, a trial software license is included to install on your own Windows computer.
2. The classroom computer lab has many open lab hours available
3. There are 10 machines with GIS software available in the CMBC MAS area of the Eckart building
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, which can be installed on your own windows machine.
6. The ACS virtual computer lab includes ArcGIS

**MAKE SURE YOU HAVE ACCESS TO THE SOFTWARE IMMEDIATELY FOR THIS COURSE.**

### **Grading System:**

Individual Project:	400 points
In-class lab exercises:	300 points
Homework:	100 points
Final Exam:	100 points
Midterm Exam:	100 points

Grades are based on percent earned

Grading scale:

A+	96-100
A	93-95
A-	90-92
B+	86-89
B	83-85
B-	80-82
C+	76-79
C:	73-75
C-	70-72
D	60-69
F:	below 60

All students will receive feedback on all assignments completed, regardless of registered units.

Required minimum components:

	1 unit	2 units	3 units	4 units	5 units
Individual project	x	x	x	x	x
In-class lab exercises			x	x	x
Homework					x
Mid-term exam				x	x
Final exam		x	x	x	x

**Most course materials are available online.** Please let the instructor know 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:

<b>My Announcements</b>	This is the first page you see upon entering your course. Announcements and reminders will be posted here.
<b>Information</b>	Syllabus will be located here.
<b>Content: Lessons</b>	The instructor's lectures.
<b>Discussion</b>	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.
<b>Content: Assignments</b>	Homework, project information, and other materials are available here.
<b>Contacts</b>	Instructor contact information is listed here.
<b>Tools: MyGrades</b>	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 [WI16]**

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](mailto: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.

<b>week</b>	<b>meeting date</b>	<b>homework due</b>	<b>lab exercise due</b>	<b>exam</b>	<b>project</b>
1	7-Jan				
2	14-Jan	1	1		
3	21-Jan	2	2		
4	28-Jan	3	3		
5	4-Feb	4	4		
6	11-Feb	-	5	Mid-term	Proposal due
7	18-Feb	5	-		
8	25-Feb	6	6		
9	3-Mar	7	7		
10	10-Mar	8	8		Posters due, presentations
11	17-Mar			final exam	Presentations