

**SIO 110: Introduction to GIS and GPS for Scientists**  
Winter Quarter 2009

**Location:**

Class: IGPP 4301 (Visualization Center, SIO Campus)

Lab: IGPP 4204 (GIS Laboratory, SIO Campus)

**Lecture:** WF 1:15-2:35 PM

**Lab:** WF 2:45-4:05 PM

First Lecture: Wednesday, January 7

Midterm: Friday, February 6

Final Lecture: Friday, March 13

**Instructor:**

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**Lab Instructor:**

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**Field Work Instructors:**

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**UCSD Library GIS Coordinator:** Tracey Hughes [t2hughes@library.ucsd.edu](mailto:t2hughes@library.ucsd.edu)

**Guest Lecturers:**

Chaitan Baru (San Diego Supercomputer Center – UCSD)

David Sandwell (Scripps Institution of Oceanography)

**Textbook:** P.A. Longley, M.F. Goodchild, D.J. Maguire and D.W. Rhind, *Geographic Information Systems and Science*, Wiley, 2005 2<sup>nd</sup> edition

**Required Supplemental Reading:** *The Mapmakers*, John Noble Wilford, Rev. Ed. 2000

**Software:** ArcView GIS 9.3 (provided)

**Online Tutorials** (<http://campus.esri.com>):

(1) *Learning ArcGIS Desktop*, ESRI (required)

**Class Web Site:** <http://sopac.ucsd.edu/projects/sio110/>

**Individual projects:**

- (1) Identify project of interest to you, and a theme/hypothesis
- (2) Collect real-time GPS data and/or other data
- (3) Manipulate data in ArcGIS, and create map using relevant GIS layers according to your theme
- (4) Prepare a report and make presentation to the class

**Grading:**

Midterm (25%)

Final - Individual projects, report and presentation (30%)

Class & Field Work (15%)

ESRI Learning ArcGIS Desktop (ESRI certification) (15%)

Book Reports (15%)

**Syllabus:***Week 1 Course introduction (January 7, 9)*

1. Introduction
2. Geodesy/Georeferencing, positioning, surveying

*Lab 1:* Orientation, ArcGIS preview

*Lab 2:* GPS tutorial

*Learning ArcGIS 9.3, (Modules 1-2)*

*Reading Assignment:* Text, Chapters 1-2, 5

*Week 2 GIS Backbone – Georeferencing, GPS (January 14, 16)*

3. Geodesy/Georeferencing, positioning, surveying
4. Small scale maps: Map projections
5. Large scale maps: UTM, state plane coordinates

*Lab 1:* ArcGIS

*Lab 2:* GPS tutorial

*Learning ArcGIS 9.3, (Module 3)*

*Reading Assignment:* Text, Chapters 3-4

*Reading Assignment:* *The Mapmakers (Part One)* – 2 page essay

*Week 3 GIS Fundamentals (January 21, 23)*

6. Nature of geographic data: representation, scale, attributes (Ch. 3-4)
7. Generalization (Ch. 3-4)
8. Data models: vector and raster data (Ch. 3, 8)

*Lab 1:* ArcGIS

*Lab 2:* GPS

*Learning ArcGIS 9.3, (Module 4)*

*Reading Assignment:* Text, Chapter 8

*Week 4 Uncertainty, Geodatabases (January 28, 30)*

9. Topology (connectivity) (Ch. 8)
10. Uncertainty (Ch. 6)
11. DBMS's, Geodatabases (Ch. 10)

*Lab 1:* ArcGIS

*Lab 2:* GPS

*Reading Assignment:* Text, Chapter 6, 10

*Reading Assignment:* *The Mapmakers (Part Two)* – 2 page essay

*Learning ArcGIS 9.3, (Module 5)*

*Week 5 Review and Midterm (February 4, 6)*

12. Individual Projects, Review for Midterm
13. Midterm (February 6)

*Learning ArcGIS 9.3, (Module 6)*

*Week 6 Guest Lectures (February 11, 13)*

14. Remote sensing (Dave Sandwell)
15. Example of GIS data portal – GEON (Chaitan Baru)

*Reading Assignment:* *The Mapmakers (Part Three)* – 2 page essay

*Reading Assignment:* Chapter 9

*Lab 1: ArcGIS*

*Lab 2: GPS*

*Learning ArcGIS 9.3, (Module 7)*

*Week 7 Web-Based Technology (February 18, 20)*

16. Distributed GIS (Open GPS Consortium – OGC)

17. Information Technology (XML, GML)

18. SOMI, Google Maps, Google Earth (KML)

19. Web Programming (Python)

*Labs: Individual Projects*

*Reading Assignment: Chapter 11*

*Learning ArcGIS 9.3, (Module 8)*

*Reading Assignment: Python tutorials*

[http://hkn.eecs.berkeley.edu/~dyoo/python/idle\\_intro/index.html](http://hkn.eecs.berkeley.edu/~dyoo/python/idle_intro/index.html)

<http://hetland.org/writing/instant-hacking.html>

*Reading Assignment: JavaScript tutorial*

<http://www.cs.brown.edu/courses/bridge/1998/res/javascript/javascript-tutorial.html>

*Reading Assignment: Google Maps tutorials (“Basics” section)*

<http://econym.googlepages.com/index.htm>

*Week 8 Spatial Analysis (February 25, 27)*

20. Query, measurement (Ch. 14)

21. Transformation (Ch. 14)

22. Spatial interpolation (Ch. 14)

23. Spatial statistics (Ch. 15)

24. Hypothesis testing (Ch. 15)

25. Error Propagation

*Labs: Individual Projects*

*Reading Assignment: Chapters 14-15*

*Assignment: Turn in ArcGIS9 certificate (February 27)*

*Reading Assignment: The Mapmakers (Part Four) – 2 page essay*

*Week 9 Individual Projects (March 4, 6)*

*Week 10 Individual Projects (March 12, 13)*

*Finals Week, March 16-20*

*Individual Project Presentations*