Some sessions starting in late January are still tentative. Field trip dates will be adjusted if necessary depending on weather. Guest lecture dates will be adjusted to accommodate guest lecturer schedules. An updated syllabus will be posted when dates get firmed up.

**Syllabus: SIO 110 - 2015 Winter Minster**
Section Information: 2016 Winter Minster  
Course Name SIO 110  
Section Instructor: Jean Bernard Minster  
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Teaching Assistant: Thomas Chaparro

**Lesson 1**  
Lesson title: Monitoring the Planet’s Heartbeat: From Eternity to Here 1960-2016  
Date January 6, 2015  
**Objectives**  
A view of geodesy through the centuries since 600BC  
Topics Focus on how space geodesy and computer technologies have completely changed geography in the past 50 years

**Lesson 2**  
Lesson title: Why do we need precise geodesy and GIS?  
Date January 8, 2016  
**Objectives**  
Review modern needs for precision geodesy and its applications in GIS. How Precision geodesy and GIS have evolved from scientific requirements to practical societal applications

**Lesson 3**  
Lesson title: GIS Representation  
Date January 13, 2016  
**Objectives:**  
Scale issues  
Digital / geographic representations attributes-- discrete vs continuous representations: vectors vs rasters

**Lesson 4**  
Lesson title: GIS Representation (Cont)  
Date January 15, 2016  
**Objectives:**  
Vectors vs rasters, continued. The role of a data model. Examples. Continuous fields vs lines. Douglas-Poiker algorithm. TIN models

**Lesson 5**  
Lesson title: The Nature of Geographic Data  
Date January 20, 2016  
**Role of GIS in government**  
Maps and databases in GIS  
Layers in GIS. Representations of objects and fields—Projections

**Lesson 6**  
Lesson title: Nature of Geographic data (2)  
Date January 22, 2016  
**Objectives:**  
Geodetic reference systems
Fractals vs smooth objects
referencing of points, lines and areas
Georeferencing, geolocating, geocoding
Datums, ellipsoids, geoid, planar and spherical coordinates

Lesson 7
Lesson title: Uncertainty (Part 1)
Date January 27, 2016
Objectives:
Importance of uncertainty statements; precision vs accuracy; the matter of scale;

Lesson 8
Lesson title: Uncertainty (part 2)
Date January 29, 2016
Objectives:
Ambiguity. Kappa index. Classification.
Extreme precision in altimetry applications

Lesson 9
Lesson title: Software and Models
Date February 3, 2016
Objectives:
GIS architecture
The importance of DBMS in GIS: Software and hardware tools for various scales

Lesson 10 Special
Guest lecturer Dr. Heather Henter
Lesson title: Review of Species on natural reserve property
Date February 5, 2016
The Natural Reserve system
Objectives: Professor Henter will give a review of the various indigenous and invasive species to be found on the UC Natural Reserve System property in La Jolla, in preparation for the term class projects. Class outing to the Knoll will follow immediately.

Lesson 11
Lesson title: Geographic Databases (1)
Date February 10, 2016
Objectives
Geodatabases
Structured Query Language (SQL)
Geographic database operators
Spatial analysis methods, annotations, topologies

Lesson 12
Lesson title: Geographic Databases (2)
Date February 12, 2016
Objectives:
Topological models Feature classes Multilevel grids
B-Trees, Quad-Trees, R-Trees
Versioning

Lesson 13
Lesson title: Cartography and Map Production
Date February 17, 2016
Objectives:
Use of topologies to build and compose maps
Map maintenance and editing
Graphics primitives
Use of maps over the ages (military)
Lesson 14
Guest lecturer from ESRI
Date February 19, 2016

Objectives:
Broader applications of GIS in unexpected fields.

Lesson 15
Lesson title: Geovisualization
Date February 24, 2016
Objectives:
Conveying information through map design
Visualization strategies and techniques
Geocoding
Cartogram transformations
3D representations
Virtual reality and GIS

Lesson 16
Lesson title: Spatial Analysis (1)
Date February 26, 2016
Objectives:
Goals of spatial analysis
Approaches
Uses of different planar projections. Representations aimed at geospatial analysis
Scatter plots and trends

Lesson 17
Lesson title: Spatial Analysis (2)
Date March 2, 2016
Objectives:
Transformations: buffering; spatial and temporal interpolation; point-in-polygon algorithm;
polygon overlays, cluster detection
Centroids, slopes, dispersion
Travel on a surface: applications of DEM to hydrology
travel on a structured layer (street map)
optimization

Lesson 18
Lesson title: Spatial Modeling and Other Uses of GIS
Date March 4, 2016
Objectives: Management and policy issues
Decision making, legal issues, safety issues, public trust
Spatial Data Infrastructures

Lesson 19
Lesson title: Partnerships, GIS and Society, where is GIS going?
Date March 9, 2016
Objectives: Considerations when implementing a GIS project.
Data access. Open data and privacy concerns.
Global out look. GIS in developing world.
Applications in specialized areas, e.g. public health, climate change

Lesson 20
Guest lecturer TBD
Lesson title (tentative): Open GIS, other platforms. Employment opportunities
Date March 11, 2016
Objectives:
Field Trip 1 (tentative)
Lesson title: Hand-held GPS
Tentative Date January 22, 2016
Objectives:
Learn how to operate a hand-held GPS receiver, and collect suitable metadata
Learn how to get these data processed.
Learn about different GPS receivers from precise receivers to hand held to smart phones
Work: survey the path surrounding the Knoll Natural Reserve

Field Trip 2 (tentative)
Lesson title: sampling species across the Natural Reserve
Date February 5, 2016
Objectives
Field measurements of various plant species on the Knoll Natural Reserve.
Collection of data to add to the past 5 years of observations