Some sessions are still tentative, depending on schedules of guest lecturers, the order of lectures may have to be adjusted. Field trip dates will be adjusted if necessary depending on weather.

Updated syllabus will be posted as dates get firmed up.

**Syllabus: SIO 110 - 2018 Winter Minster**
Section Information: 2018 Winter Minster  
Course Name SIO 110  
Section Instructor: Jean Bernard Minster  
E-mail jbminster@ucsd.edu  
Teaching Assistant: Jacques Lyakov

**Lesson 1**  
Lesson title: Monitoring the Planet’s Heartbeat: From Eternity to Here 1960-2017  
Date January 10, 2018  
**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 12, 2018  
**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 17, 2018  
**Objectives:**  
Scale issues  
Digital / geographic representations attributes-- discrete vs continuous representations: vectors vs rasters

**Lesson 4**  
Lesson title: GIS Representation (Cont)  
Date January 19, 2018  
**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 24, 2018  
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 26, 2018
Objectives:
Geodetic reference systems
Fractals vs smooth objects
referencing of points, lines and areas
Georeferencing, geolocating, geocoding
Datums, ellipsoids, geoid, planar and spherical coordinates

Class outing to the Knoll #1 will follow immediately after the lecture.

Lesson 7
Lesson title: Uncertainty (Part 1)
Date January 31, 2018
Objectives:
Importance of uncertainty statements; precision vs accuracy; the matter of scale;

Lesson 8
Lesson title: Uncertainty (part 2)
Date February 2, 2018
Objectives:
Ambiguity. Kappa index. Classification.
Extreme precision in altimetry applications

Lesson 9
Lesson title: Software and Models
Date February 7, 2018
Objectives:
GIS architecture
The importance of DBMS in GIS: Software and hardware tools for various scales

Lesson 10
Lesson title: Geographic Databases (1)
Date February 9, 2018
Objectives
Geodatabases
Structured Query Language (SQL)
Geographic database operators
Spatial analysis methods, annotations, topologies

Lesson 11
Lesson title: Geographic Databases (2)
Date February 14, 2018
Objectives:
Topological models Feature classes Multilevel grids
B-Trees, Quad-Trees, R-Trees
Versioning

Lesson 12 Special
Guest lecturer Dr. Heather Henter
Lesson title: Review of Species on natural reserve property
Date February 16, 2018
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 #2 will follow immediately after the lecture.
**Lesson 13**
Lesson title: Cartography and Map Production  
Date February 21, 2018  
**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 (TBD)**  
Date February 23, 2018  
**Objectives:**  
Broader applications of GIS in unexpected fields.

**Lesson 15**  
Lesson title: Geovisualization  
Date February 28, 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 March 2, 2018  
**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 7, 2018  
**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 9, 2018  
**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 14, 2018
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 ?
Lesson title (tentative): Miscellaneous topics (e.g. Open GIS, other platforms). Employment opportunities in GIS and applications thereof. Research platforms.
Date March 16, 2018
Objectives: What are the options to use GIS in future work, research or employment

Field outings

Field Trip 1 (weather permitting)
Lesson title: Hand-held GPS
Tentative Date January 26, 2018
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 (weather permitting)
Lesson title: sampling species across the Natural Reserve
Date February 16, 2018, after guest lecture by Professor Heather Henter
Objectives
Field measurements of various plant species on the Knoll Natural Reserve.
Collection of data to add to the past half-decade of observations
Preparation for class projects.