Some sessions starting in late January are still tentative.

**Syllabus: SIO 110 - 2015 Winter Minster**
Section Information: 2015 Winter Minster
Course Name SIO 110
Section Instructor: IWDC System
Section Instructor: Jean Bernard Minster
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Teaching Assistant: Eric Lindsey

**Lesson 1**
Lesson title: Monitoring the Planet’s Heartbeat: From Eternity to Here 1960-2010
Date January 7, 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 9, 2015
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 14, 2015
Objectives:
Scale issues
Digital / geographic representations attributes-- discrete vs continuous representations: vectors vs rasters

**Lesson 4**
Lesson title: GIS Representation (Cont)
Date January 16, 2015
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 21, 2015
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 23, 2015
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 28, 2015
Objectives:
Importance of uncertainty statements; precision vs accuracy; the matter of scale;

Lesson 8
Lesson title: Uncertainty (part 2)
Date January 30, 2015
Objectives:
Ambiguity. Kappa index. Classification.
Extreme precision in altimetry applications

Lesson 9
Lesson title: Software and Models
Date February 4, 2015
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 6, 2015
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 11, 2015
Objectives
Geodatabases
Structured Query Language (SQL)
Geographic database operators
Spatial analysis methods, annotations, topologies

Lesson 12
Lesson title: Geographic Databases (2)
Date February 13, 2015
Objectives:
Topological models  Feature classes  Multilevel grids
B-Trees, Quad-Trees, R-Trees
Versioning

Lesson 13
Lesson title: Cartography and Map Production
Date February 18, 2015
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 Dr. Lyall Bellquist
Date February 20, 2015
Lesson title: Objectives Movement patterns and habitat selection of ocean whitefish (Caulolatilus princeps) in a southern California marine reserve: An application of GIS

**Objectives:**
Broader applications of GIS in unexpected fields.

**Lesson 15**
Lesson title: Geovisualization
Date February 25, 2015
**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 27, 2015
**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 4, 2015
**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 6, 2015
**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 10, 2015
**Objectives:**
Considerations when implementing a GIS project.
Data access. Open data and privacy concerns.
Global outlook. 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 12, 2015
**Objectives:**

**Field trip 1**
Lesson title: Hand-held GPS
Date January 23, 2015
*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**
Lesson title: sampling species across the natural reserve
Date February 6, 2015
*Objectives*
Field measurements of various plant species on the Knoll Natural Reserve.