Syllabus: SIO 110 - 2014 Winter Minster
Section Information: 2014 Winter Minster
Course Name SIO 110
Section Instructor: IWDC System
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Lesson 1
Lesson title: Monitoring the Planet’s Heartbeat: From Eternity to Here 1960-2010
Date January 8, 2014
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 10, 2014
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
Guest lecturer Dr. John Helly
Lesson title: GIS Representation
Date January 15, 2014
Objectives:
Scale issues
Digital / geographic representations attributes-- discrete vs continuous representations: vectors vs rasters

Lesson 4
Guest lecturer Dr. John Helly
Lesson title: GIS Representation (Cont)
Date January 17, 2014
Objectives:
Vectors vs rasters, continued. The role of a data model. Continuous fields vs lines.
Douglas-Poiker algorithm. TIN models

Lesson 5
Lesson title: The Nature of Geographic Data
Date January 22, 2014
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
Date January 24, 2014
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 29, 2014
Objectives:
Importance of uncertainty statements; precision vs accuracy; the matter of scale;

Lesson 8
Lesson title: Uncertainty (part 2)
Date January 31, 2014
Objectives:
Ambiguity. Extreme precision in altimetry applications

Lesson 9
Lesson title: Software and Models
Date February 7, 2014
Objectives:
GIS architecture
The importance of DBMS in GIS: Software and hardware tools for various scales

Lesson 10
Guest lecturer Dr. Lyall Bellquist
Date February 12, 2014
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 11 (Special, class projects)
Guest lecturer Prof. Heather Henter
Lesson title: Review of Species on natural reserve property
Date February 14, 2014
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.

Lesson 12
Lesson title: Geographic Databases
Date February 19, 2014
Objectives
Geodatabases
Structured Query Language (SQL)
Geographic database operators
Spatial analysis methods, annotations, topologies

Lesson 13
Lesson title: Geographic Databases (Cont)
Date February 21, 2014
Objectives:
Topological models Feature classes Multilevel grids
B-Trees, Quad-Trees, R-Trees
Versioning

Lesson 14
Lesson title: Cartography and Map Production
Date February 26, 2014
Objectives:
Use of topologies to build and compose maps
Map maintenance and editing
Graphics primitives
Use of maps over the ages (military)

**Lesson 15**
Lesson title: Geovisualization
Date February 28, 2014
*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 5, 2014
*Objectives:*
Goals of spatial analysis
Approaches
Uses of different planar projections

**Lesson 17**
Lesson title: Spatial Analysis (2)
Date March 7, 2014
*Objectives:*
Representations aimed at geospatial analysis
Scatter plots and trends
Transformations: buffering; spatial and temporal interpolation; point-in-polygon algorithm; polygon overlays, cluster detection

**Lesson 18**
Lesson title: Spatial Analysis (3) and Inference
Date March 12, 2014
*Objectives:*
Measuring lengths, areas
Centroids, slopes, dispersion
Travel on a surface: applications of DEM to hydrology
Travel on a structured layer (street map)
Optimization

**Lesson 19**
Lesson title: Spatial modeling and other uses of GIS
Date March 14, 2014
*Objectives*
Management and policy issues
Decision making, legal issues, safety issues, public trust
Spatial Data Infrastructures

**Field trip 1**
Lesson title: Hand-held GPS
Date TBD
*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 TBD
Objectives
Field measurements of various plant species on the Knoll Natural Reserve.