

Syllabus: SIO 110 - 2014 Winter Minster

Section Information: 2014 Winter Minster

Course Name SIO 110

Section Instructor: IWDC System

Section Instructor: Jean Bernard Minster

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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.