

**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