Coastal Applications, Gardan and Breach Science Publications, Pennsylvania, USA.


WEB WEBSITES
www.cstars.ucdavis.edu
www.ccrs.nrcan.gc.ca
www.fs.fed.us
www.rese.ch
www.informatics.org
www.colorado.edu
www.terrin.org

PRACTICAL-IV
GIS and Data Analysis

Surface Analysis
1. Contour
2. Slope
3. Aspect
4. Hill Shade
5. Shortest Path Analysis
6. Mapping Density and Spatial Modeling
7. Site Suitability Model
8. Dam Model
9. Creating TIN surface from Vector Data
10. Creating TIN from Raster Data

* Distribution of Marks for Practical-III & IV :-

<table>
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<th>Sr.No.</th>
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<td>1</td>
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<td>Remote Sensing Applications (40), Internal Assessment-Practical Record (3) + Viva-Voce (2) + Field Tour &amp; submission of Report (5)</td>
<td>50</td>
</tr>
</tbody>
</table>

REFERENCES


Mitchell, A., Booth Bob and Crosier Scott, 2002, Getting Started with Arc GIS, Environmental Systems Research Institute, Inc., Red Lands, California. USA


WEB SITES
www.earthmapping.com/papers
www.innovativegis.com/basis/primer/organ.html
www.posc.org/Epicentre2_2/Datamodel/ExamplesofUsage/ey_cs.html
www.simplextechnologies.com/ProjectsExecuted.asp
www.students.sbc.edu/michael503
GIS - PROJECT TASKS

Unit-I Arc GIS: Introduction Arc Catalogue: viewing and connecting the data. ArcMap: working with maps exploring map adding a layer adding features from data base adding labels working with map layout saving and printing maps.

Unit-II Exploring GIS Data: Geographic data models formats of feature data, planning a GIS project GIS analysis steps in a GIS Project project planning. Assembling the data base: project data base adding data to project folder previewing data in Arc Catalogue organization examining data in Arc Map cleaning up catalogue tree.

Unit-III Preparing Data for Analysis: data preparation tasks defining coordinate system for the elevation data coordinate systems projecting the river shape file exporting the river shape file to the geodatabase digitizing the historic park merging parcel layers.

Unit-IV Performing Date Analysis: setting for analysis plant site delineating the area within and outside the site finding parcels to meet the criteria finding vacant parcels finding suitable parcels meeting the required total area reviewing analysis results.

Unit-V Presenting the Results: map design setting up map page creating overview map creating maps of suitable and highly suitable parcels creating parcel report adding list of site criteria to map adding map elements saving and printing of maps.

REFERENCES
WEB SITES
www.earthmapping.com/papers
www.innovativegis.com/primer/organ.html
www.posc.org/Epicentre2_2/Datamodel/ExamplesofUsage/ey_cs.htm
www.simplextechnologies.com/Projects_Executed.asp
www.students.sbc.edu/michael

Paper X SPATIAL MODELING AND ANALYSIS

Unit-I Modeling Spatial Problems: Introduction need for spatial models conceptual model for solving spatial problems steps involved. Types of spatial models descriptive and process models types of process models creating conceptual models - site suitability model.

Unit-II Raster Modeling: Understanding raster data set composition of raster dataset coordinate space and raster data set discrete and continuous data resolution raster encoding representing features in raster data set assigning attributes.

Unit-III Spatial Analysis: Understanding spatial analysis - operators and functions local, focal, zonal, global and application functions surface analysis: slope, hill shade, contour and hydrologic analysis mapping distance: shortest path mapping density cell statistics neighborhood statistics reclassification.

Unit-IV Creating Surface models: Introduction creating raster surface from points interpolating a raster surface creating TIN surface from vector data building TIN creating a TIN from a raster creating a raster from a TIN.
Unit-V  Analyzing Surfaces: Understanding the shape of a surface – calculating slope, mapping contours - deriving contour lines from a surface – calculating area and volume.

REFERENCES
Mitchell, A., Booth Bob and Crosier Scott, 2002, Getting Started with ArcGIS. Environmental Systems Research Institute, Inc., Red Lands, California. USA -92373-8100

WEB SITES
www.earthmapping.com/papers
www.innovativegis.com/basis/primer/organ.html
www.posc.org/Epicentre2 _2/Datamodel/ExamplesofUsage/ey_cs.html
www.simplextechnogies.com/Projects Executed.asp
www.students.sbc.edu/michael503

Paper XI
Principles of GPS

Unit-I.  GPS and its utilities: Historical - Various GPS Software products and peripherals - recent trends.


Unit-IV  Geodetic Aspects: GPS coordinate system - local coordinate system – transformations - map projections and plane coordinates – the transverse Mercator Projection; the Lambert projection.

Unit-V.  Surveying with GPS: GPS Measuring techniques – rapid static surveys - kinematic surveys - RTK surveys; pre-survey

References:
1.  ESRI Arc Pad Manual
2.  Introduction to GPS (Global Positioning System) 1. by Leica.

Websites:
1.  www.geography network.com
2.  www.esri.com
3.  www.gpsworld.com
4.  www.trimble.com
5.  www.garmin.com
6.  www.gps_society.org
http://www.epa.gov/gisvis
http://water.usgs.gov/nwc
http://terra.nasa.gov
http://www.pmel.noaa.gov
http://www.mojavedata.gov
http://www.regis.berkeley.edu/sue/phd
http://www.sfei.org
http://www.whrc.org/science/globfor

Paper XII
GPS GIS Integration and Applications

Unit-I.  Basic for GPS and GIS Integration: Windows CE devices and pocket PCs - transferring data to a window CE device - windows CE resources, maps and layers - layer properties: map projections:
Unit-II  
Displaying data: Creating a new map - adding layers - adding shape files - adding images - specifying a coordinate system - symbolizing data.

Unit-III  
Connecting and navigating with GPS: Supported GPS protocol; setting communication parameters - activating GPS - selecting a navigation destination - GPS track log - starting and stopping GPS track log - creating point, line and polygon features with GPS.

Unit-IV  
Editing the data and exporting to GIS environ: Editing basics - creating new layers for editing - selecting layers for editing - selecting feature for editing - moving and deleting features - extending a line; inserting and deleting vertices - moving a vertices - editing attributes. Preparing the data for Arc Pad - exporting symbology - creating an Arc Pad Map - packing shape files.

Unit-V  
GPS Applications: GPS Applications - Geo-referencing - sampling; cartographic updating - navigation and mobile tracking.

References:
ESRI ArcPad Manual Introduction to GPS (Global Positioning System) 1. by Leica.

Websites:
1. www.geography network.com
2. www.esri.com
3. www.gpsworld.com
4. www.trimble.com
5. www.garmin.com
6. www.gps_society.org
7. www.dbartlett.com

Practical V  
GIS Integration
a. Working principles of GIS
b. GIS integration techniques and applications
c. Software and hardware needs of GIS
d. Collecting ground control points
e. Lines
f. Polygons
g. Editing points, lines and polygons
h. Geo referencing using GIS techniques
i. Exporting to GIS Environments.

Practical VI  
Field Survey and GPS Integration
a. Field survey
b. Working principles of GPS
c. Surveying with GPS
d. Software and hardware needs of GPS
e. Geo referencing using GPS
f. GPS integration and applications

* Distribution of Marks for Practical-V & VI:*

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</tr>
</tbody>
</table>

References:
ESRI ArcPad Manual Introduction to GPS - Global Positioning System by Leica.

Websites:
www.geography network.com
www.esri.com
www.gpsworld.com
www.trimble.com
www.garmin.com
www.gps_society.org
www.dbartlett.com

M.Sc. Part-II  
SEMESTER VI
Paper XIII

GIS Applications in Natural Resources and Management

Unit-I  
Natural Resource Evaluation: Need – objectives – source of data – limitations – need for evaluation in development planning

Unit-II  
Unit-III  Wastelands: Types of identification of management of eroded lands - types of layer creation in case studies.

Unit-IV  Water Resources: Surface water: precipitation in space time analysis of overland flow in storage in groundwater: potential quality - layer creation in overlay analysis integrated watershed development - case studies.

Unit-I  Natural Vegetation: Forests - classification of grasslands - layer creation in overlay - management in case studies.

References
4. Heit, Michael, H. Dennison Parker, and Art Shortreid (eds.), 1996. GIS
9. Young, Haines, David Green, and Steven Cousins (eds.), 1994. Landscape
11. Ecology and GIS, Taylor & Francis, Bristol, P.A.

On-line journals:
http://camfer.CNR.Berkeley.EDU/monitoring/- go to Workgroup Resources and Publications
http://www.gisdevelopment.net

Links:
ESPM 275 class Schedule
UC Berkeley Academic Calendar

**Paper XV**

**Internet GIS**

**Unit-I.** Introduction: Internet, web and Internet GIS. Fundamentals of computer networking i network environment i network communication models i Protocols i TCP/IP.

**Unit-II** Client/server computing i client i server i glue i client/ server system partition i layered architecture i advantages and disadvantages of client server architecture. Distributed component framework i web mapping i static and interactive web mapping i open GIS web map server.

**Unit-III** Distributed geographic information services i principle i components i logic and data components.

**Unit-IV.** Geographic markup language - principle i characteristics - commercial web mapping programs - mobile GIS. Distributed GIS in data warehousing and data sharing.

**Unit-V** Internet GIS Applications in intelligent transportation systems, planning and resource management.

**Paper XVI**

**Thermal and Radar Remote Sensing**

**Unit-I** Thermal Remote Sensing: Radiant flux i heat transfer i thermal infrared radiation i thermal properties of materials i emissivity of materials i thermal inertia of Earth surface features.

**Unit-II** Thermal IR detection and imaging - characteristics of TIR images. Factors controlling IR Survey i applications - comparison of IR images with other TM band and aerial photographs.

**Unit-III** Radar Remote Sensing : Meaning i aircraft radar system i SLAR - components, imaging system, wavelengths i range and azimuth resolution - real aperture and synthetic aperture systems.

**Unit-IV** Satellite Radar system : Seasat SIR i radar return and image signatures i geometry of radar Images i geometry of radar images i mosaics.

**Unit-V** Image Characteristics: Polarization, look direction and image irregularity -image interpretation i terrain, structures, vegetation, sand, land use and land cover.

**Practical VII**

Remote sensing interpretations in water resources

01. Spectro Radiometric Survey of Water Bodies.
02. Analysis of Aerial Photographs and Satellite Images for Drainage Morphometry and Water Shed Demarcation.
05. Analysis of Satellite and Aerial Photographs for Mapping Lithologically And Structurally Controlled Aquifer Systems.
06. Mapping of Geomorphic Aquifers
07. Identification Of Recharge Areas Using Remotely Sensed Data.
08. Analysis of Thermal and Microwave Data for Ground Water Targeting.
09. Land use / Land cover Mapping Upto Level II Using Aerial Photos and Satellite Images.

**Practical VIII**

Project work

Each student should undertake Project work allotted by the Head of the Department in a given area pertaining to Remote Sensing and GIS by the end of Semester V and should submit project report by the end of Semester VI.

* Distribution of Marks for Practical-VII & VIII :-*

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<td>50</td>
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**References**


Websites:
  www.geography-network.com
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  www.dbartlett.com

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