Syllabus for GEOS 458 / 658 – Geoscience Applications of GPS and GIS

1. Course Information:
   Title: Geoscience Applications of GPS and GIS
   Number: GEOS 458 / GEOS 658
   CRN: 36013 / 36030
   Prerequisites: GEOS 225 or permission of instructor
   Recommended: MATH F107X; MATH F200X.
   Location: Lectures in WRRB 004
             Labs in WRRB 004
   Term: Spring semesters
   Meeting time: Lectures: Wednesday and Friday, 1:00 – 2:00PM
                Labs: Wednesday, 2:15 – 5:15PM

2. Instructor Information:
   Anupma Prakash
   Office: Room 108E, WRRB, UAF
   Telephone: 907-4741897
   Email: prakash@gi.alaska.edu
   Office hours: ad hoc / by appointment

   (Email is the best way to reach me. If it is urgent and it is during the evening hours or weekend you can also reach me at my home telephone number: 4554159)

   Barbara Truessel (Teaching Assistant)
   Office: Room 401-I Elvey Bldg. (Geophysical Institute)
   Telephone: 907-474-7443
   Email: btruessel@gi.alaska.edu
   Office hours: TBD, or by appointment

3. Recommended supplementary readings:
   Books
   • GIS Concepts and ArcGIS Methods by David M. Theobald
   • Getting Started with ArcGIS: ArcGIS 9
   • Getting to Know ArcGIS Desktop by Ormsby T. et al.
   • Geographical Information Systems – Principles, Techniques, Applications and Management by Longley et al.
   • Principles of Geographical Information Systems by Burrough and McDonnell

   Journals and Magazines
   • International Journal of GIS
   • Geoinformatics
   • Geospatial Solutions
   • GIS Development
   • GPS World

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4. Course description:
This course explores advanced digital techniques used in geoscience analysis and research. The students learn the principles and techniques of Global Positioning Systems (GPS) and Geographic Information Systems (GIS). Students will determine locations of geological/geophysical/geochemical observations using a GPS and will carry out post-processing GPS corrections. Through hands-on data acquisition they will determine limits of GPS data accuracy. Students will collect data, merge data from different sources, and analyze spatial relationships using GIS tools. Using real-world examples, students will re-project and rectify spatial data collected in different map projections and datums. Course will emphasize integration of ground-based observations, remote sensing data, and legacy maps. Students will carry out an independent project which will include generating digital and printed maps.

5. Course Goals and Student Learning Outcomes:
Goal: The goal of this course is to take the students beyond what they have learned in a basic course in field and computer methods in geology (GEOS 225), with special focus on the principles, techniques, and real-world application of GPS and GIS.

Student Learning Outcomes: By the end of the course, students will be able to
• Use simple and advanced GPS receivers
• Process differential GPS data
• Integrate GPS data into a GIS
• Incorporate simple tabular data into GIS using MS Excel as an intermediate tool
• Search, download and integrate data available from many sources into a GIS database.
• Scan and georeference large format legacy maps and old aerial photos
• Reproject and rectify spatial data collected from in different map projections and datums
• Perform simple spatial analysis operations on tabular, vector and raster data sets.
• Integrate raster data with vector data to generate final map products.
• Generate readable maps controlling annotation and labeling
• Apply the acquired theoretical and practical knowledge to complete an independent term project on a topic of their choice.

6. Instructional methods:
• 1 hour lecture meeting twice a week. Lectures will be interactive and will involve use of power point presentations, blackboard, and group discussions. Material will be posted on the web.
• 3 hour laboratory component once a week will include hands-on experience with a variety of digital data, GPS equipment, and geospatial software packages.
• Reading assignments from materials provided and recommended readings on selected topics will be an integral part of the course.
• Independent project work

7. Course calendar: See attached schedule
8. Course policies:
   Attendance in lectures and labs is essential. For some reason, if the course participant can not
be present for a lecture or lab, they should inform the instructor in advance and make
arrangements for make up of the time. During lecture times the students will not be allowed
to use any electronic devices such as cell phones, i-pads, laptops, kindles, desktop computers
e tc. If you have a special situation which requires you to have a cell phone on you, please
come and discuss with me to seek permission. Each student is expected to abide by the UAF
Student Code of Conduct (visit: http://www.uaf.edu/catalog/current/academics/regs3.html).
Plagiarism of any sort will not be accepted.

9. Grading Policy:
   Three graded homework assignments: 30%
   Independent Project (including final presentation): 40%
   Lecture and lab participation and completion: 30%

10. Independent Project:
   Each student is required to carry out an independent term project. The project must use
raster, vector, and tabular data. Students are encouraged to work on a topic that helps extend
their ongoing thesis research or professional work in industry. They are also encouraged to
discuss their project early on with the instructor and turn in a 1-2 page project proposal for
approval by the indicated day. Students should be aware that the independent term project is
time demanding. Though some time will be available during the scheduled lab hours, these
hours will be insufficient to complete the project, and students should be prepared to put in
extra work hours. Judiciously selected projects with diligent effort from the very start may
yield results suitable for subsequent publication in either conference proceedings or peer-
reviewed journals. Students should keep this in mind as they develop and carry out their
projects.

11. Disabilities Services:
   The instructor will work with the Office of Disabilities Services to provide reasonable
accommodation to students with disabilities.