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

1. Course information:

Title:	Geoscience applications of GPS and GIS
Number:	GEOS 404 / GEOS 604
Credits:	3
Prerequisites:	GEOS 225 or permission of instructor
Location:	Lectures in Natural Science Facility; Room 233
	Labs in Natural Science Facility; Room 316
Term:	Every Spring (starting Spring 2007)
Meeting time:	One hour lecture, twice a week (days TBD)
	Three hour lab, once a week (days TBD)

2. Instructor Information:

Name:	Instructor 1: William Witte (Odd Spring, starting 2007)
	Instructor 2: Anupma Prakash (Even Spring, starting 2008)

William Witte

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Anupma Prakash

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Office hours:	ad hoc / by appointment

3. Course readings/materials:

No specific text book is required for this course. The instructors will be providing reading material and detailed lab instructions that will be posted on the class web site.

Recommended supplementary readings:

Books

- GIS Concepts and ArcGIS Methods by David M. Theobald
- Getting Started with ArcGIS: Updated for ArcGIS version 8.3
- 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

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 differential GPS techniques and apply real-time and post-processing GPS corrections. Through hands-on data acquisition they will determine limits of GPS data accuracy. Students will collect data into geodatabases, 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 applications 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 and MS Access as intermediate tools
- *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.
- *Generate* readable maps containing annotation and labeling; and 3D flythroughs
- *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/Schedule:** See separate document

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. Each student is expected to abide by the UAF Student Code of Conduct
(visit: http://www.uaf.edu/catalog/current/academics/regs3.html)

9. **Grading Policy:**

+/- grades will be implemented. Grading system is absolute

Three graded homework assignments: 30%
Independent Project (including final presentation): 40%
Lecture and lab participation: 30%

A+	=	95 to 100
A-	=	90 to 95
B +	=	85 to 90
B -	=	80 to 85
C+	=	75 to 80
C-	=	70 to 75
D+	=	65 to 70
D-	=	60 to 65
F	=	Below 60

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 systematic work put in from the very start may be suitable for subsequent publication in either conference proceedings or the peer-reviewed journals. Students should keep this goal 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.