Course Syllabus

GIS 5075 Global Positioning Systems

SPR 2015, Tuesdays, 2-4:45 PM

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Global Positioning Systems, Course number GIS 5075

CATALOG DESCRIPTION

Examination of the theory, operation and application of Global Position Systems (GPS)

COURSE DESCRIPTION

GPS is a satellite-based navigation system that provides all-weather, worldwide, 24-hour position and time information. GPS can be used for a variety of applications to collect location information for use in Geographic Information Systems (GIS). Course topics include: planning for data collection; field data collection; processing using differential correction; using GPS data in GIS; and GIS applications.

A combination of lectures, demonstrations, hands-on exercises, and field sessions will be used. The hands-on exercises in the course will focus on mapping-grade GPS, including the use of differential correction (real-time and post-processing). A range of equipment will be used or demonstrated to get a good feeling of the pros and cons of the various types of GPS available. These experiences, lectures and demonstrations will not only provide students with hands-on knowledge on how to operate the GPS equipment, but will also allow students to develop a better understanding of what type of GPS is needed for a particular application. Accuracy needs, equipment specifications, and equipment feasibility and cost will be covered.

A range of field project planning and applications will be presented through the use of case-studies and lecture. Topics and examples will include GPS for public utilities, cultural and natural heritage projects, transportation, environmental science, and conservation biology. Finally, the integration of GIS with other technologies will be explored, including real-time tracking, location-based services, mobile GIS, and RTK GPS (survey grade).

TEXT

No textbook – readings TBA
PREREQUISITE(S)

GIS 5049 (GIS for non-majors) or similar, or permission from the instructor. No prior GPS knowledge is required for this course but you are expected to be computer literate and have a strong working knowledge of the Windows platform. In addition, students are expected to be familiar with the fundamentals of Geographic Information System; students are expected to have familiarity with concepts such as map scale, coordinate systems, vector data model characteristics, spatial data collection methods, basic spatial analysis techniques and other fundamental GIS concepts.

COURSE OBJECTIVES

1) To develop a solid understanding of the fundamentals of GPS;

2) To learn how to set up and operate the components of a mapping-grade GPS system;

3) To become familiar with a range of GPS equipment and software;

4) To practice the workflow of a typical GPS project;

5) To become familiar with a range of GPS applications;

6) To explore the integration of GPS with other technologies;

7) To become familiar with the range and types of GPS equipment including differential GPS (DGPS) and real-time kinematic (RTK) type systems.

REQUIREMENTS

**Attendance:** Coming to class and active participation in all classes is expected. Please inform the instructor ahead of time if you anticipate you will have to miss a class. **Grading policy:** The plus/minus grading system will be used to assign student grades. **Assignments/exams:** Standard enrollment and successful completion of this course yields three (3) credits, and counts toward the GIS certificate program requirements. Grades will be based on lab assignments (50%), final exam (15%), and final project and its class and digital presentation (35%).

Evaluation of performance is dependent on students submitting products of good quality and meeting all submission deadlines, which are provided in the course schedule. Late submission of assignments will result in a reduction of the grade for that assignment of 10 points (out of 100 points total) per day. Students are also advised to take note of the policy on incomplete grades and academic dishonesty (see USF course catalog).
ASSIGNMENTS

**Labs:** In total, 5 lab assignments are required. Each of these assignments will count towards 10% of the final grade (50% total). Details on the expected format and content of lab reports will be provided in class. **Final Project:** Detailed guidelines for the final project and its class and digital presentation will be provided as a separate document. **Exam:** An exam review will be provided ahead of time and discussed in class.

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<thead>
<tr>
<th>ITEM</th>
<th>PERCENTAGE</th>
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<tbody>
<tr>
<td>Lab Assignments</td>
<td>50%</td>
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<tr>
<td>Final Exam</td>
<td>15%</td>
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<tr>
<td>Final project: Class presentation and digital presentation of project as described in the final project assignment (15% for presentation and 20% for deliverables)</td>
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**GRADING SCALE:**

A+ = 100-98%, A=97-94%, A-=93-90% B+ = 89-87%, B=86-83%, B-=82-80%, C+ = 79-77%, C=76-73%, C-=72-70% D+ = 69-67%, D=66-63%, D-=62-60%, F= below 59%

**COURSE SCHEDULE**

A detailed course schedule will be made available and posted on the course website (Canvas). The schedule will contain the course topics and readings for each week, lab sessions, and deadlines for assignments. The course schedule is subject to change – changes will be announced in class, but students are responsible for accessing the most recent version on the course website.

**Week 1.** January 6<sup>th</sup>, Course Overview and the Fundamentals of GPS

**Week 2.** January 13<sup>th</sup>, Introduction to Lab Reports, Lab 1: GPS Overview (**Lab due Jan. 27<sup>th</sup>**)

**Week 3.** January 20<sup>th</sup>, Introduction to ArcPad, Continue Lab 1

**Week 4.** January 27<sup>th</sup>, GPS Project Workflow Part 1 (Field Recon, Mission Planning and Data Dictionaries), Lab 2: Fieldwork and Survey (**Lab due Feb. 10<sup>th</sup>**)

**Week 5.** February 3<sup>rd</sup>, GPS Project Workflow Part 2 (Field Data Collection and Exporting to GIS), Continue Lab 2

**Week 6.** February 10<sup>th</sup>, Differential Correction and Pathfinder: Lab 3: Differential Correction (**Lab 3 due February 24<sup>th</sup>**)

**Week 7.** February 17<sup>th</sup>, Accuracy and Precision and Why Post-process GPS data, Continue Lab 3

**Week 8.** February 24<sup>th</sup>, GPS and LiDAR Applications, Lab 4- GPS and LiDAR (**Lab 4 due March 17<sup>th</sup>**)
Week 9. March 3\textsuperscript{rd}, NO CLASS SPRING BREAK

Week 10. March 17\textsuperscript{th}, Using GPS for field truth verification and survey projects, Lab 5: The Complete Project—Design, Methods, Implementation, and Results (Lab 5 due March 31\textsuperscript{st})

Week 11. March 24\textsuperscript{th}, Integration of GPS with other forms of remote sensed and spatial data in GIS

Week 12. March 31\textsuperscript{st}, High-End Systems; differential GPS (DGPS) and real-time kinematic (RTK) type systems

Week 13. April 7\textsuperscript{th}, Ethics and Privacy Issues with Geospatial Data

Week 14. April 14\textsuperscript{th}, Class Presentations Group 1

Week 15. April 21\textsuperscript{st}, Class Presentations Group 2 and Digital Project Deliverables due

FINAL EXAM: Finals week is April 25\textsuperscript{th} – May 1\textsuperscript{st} (we will follow the official exam matrix for the course final)

GIS LAB ACCESS

Students will be given access to the GIS lab (NES219 and 220) through their USF ID card as well as an account to use the PCs in the GIS lab. Students will need to access the lab outside of scheduled class times to complete the lab assignments. It is the student’s responsibility to become familiarized with the operation and rules of the GIS lab. Students are responsible for keeping their account in good standing. No materials unrelated to the GIS courses are allowed on the computers in NES or in the AIST labs. Storage space allocations will be checked periodically to determine if any students exceed the reasonable amount of storage. Additional access is provided to the AIST Computer lab, with availability M, W, F 9AM-4PM, and at other times by appointment and excluding other course scheduled times on TR. You should bring and have access to an external storage device for your file data storage needs during this course.

Students with disabilities may request appropriate academic accommodations from the USF Services for Students with Disabilities. Scholastic dishonesty of any type will not be tolerated. Violators will be referred for possible disciplinary action, which in the extreme may result in expulsion from the University.