MECH 5970/6970: Fundamentals of GPS Navigation
Fall 2006
Room TBA, TR 2:00-3:15

Instructor: Dr. David M. Bevly (Haley 0316-S) and Matthew Lashley

Phone: 844-3446

Office Hours: Tuesday-Thursday, 12:30-11:50

Class Website: TBA

Textbook: P. Misra, P. Enge, *Global Positioning System: Signals, Measurements, and Performance*, Ganga-Jamuna Press, Lincoln, MA, 2001.

Supplemental References:

Parkinson, Bradford W. and James J. Spilker Jr. "Global Positioning System: Theory and Applications." Vols 1&2. Progress in Astonautics and Aeronautics. AIAA, 1996.

Kaplan, Elliott D. "Understanding GPS: Principles and Applications," Artech House, 1996.

Hofmann-Wellenhof, B., H. Lichtenegger, and J. Collins. "GPS Theory and Practice." Fifth revised edition. Springer, 2004.

Beginning MATLAB for Engineers, S. J. Reeves, College House Enterprises, LLC, 2001, 20 pp.

Matlab Help located at:
http://www.eng.auburn.edu/department/ee/pages/comp_tools.html

Pre-Requisites: MECH3140 or ELEC3500

Strongly Recommended Pre-Requisite: Statistics, Matlab

Grading Policy:

1.	2 Exams	25
2.	Homework	25
3.	Lab Assignments	25
4.	Final Project	25
	Total	100

Lab Assignments:

This course will include several laboratory assignments which will consist of GPS data collection and analysis.

Scale:

90-100 - A	70-79 - C
80-89 - B	60-69 - D
	Below 60 - F

Tentative Lecture Topic Outline (Subject to Change):

Week	*Topic*
1	Introduction to Various Navigation Technologies
2	GPS Overview
3	Triangulation and Least Squares Best Fit
4	GPS Operation and signal structure,
5	Receiver Hardware
6	GPS Signal Tracking (Phase Lock Loops)
7	GPS Code Tracking (Delay Lock Loops)
8	Math and Statistics for GPS Signal Processing
9	Math and Statistics for GPS Signal Processing
10	Satellite Tracking
11	Ephemeris Decoding
12	Navigation Decoding
13	PVT Calculation
14	Introduction to Advanced GPS Techniques
15	Introduction to Integration with Inertial Measurements

General Policies

Class attendance is expected but not *formally* recorded. Late submission of assigned work or make-up examinations will be allowed if and only if accompanied by an approved University excuse. Additionally, I expect a very high standard of honesty among students at Auburn University as I feel that engineers with moral integrity is of the utmost importance in society. Because of the importance of academic honesty to the reputation of Auburn Engineers, I will report violations of academic honesty as outlined in the Auburn Tiger Cub.

Accessibility

It is the policy of Auburn University to provide accessibility to its programs and activities, and reasonable accommodations for persons defined as having a disability under Section 504 of the rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990. Students who need special accommodations should make an appointment to see the instructor as soon as possible or contact The Student with Disabilities Program office at (334) 844-5943 (Voice/TT)

New Technical Elective/Graduate Class in GPS Navigation

MECH 5970/6970: Fundamentals of GPS Navigation
(class may be co-listed with AERO and/or ELEC if needed)
Taught by Dr. Bevly and Matthew Lashley
Tuesday and Thursday 2-3:15

We will take students through the basics of GPS navigation and signal structure to signal acquisition, tracking, and data-decoding to determine GPS message data, satellite position, etc. Student teams will be given access to GPS receivers to collect and analyze data. Lab assignments will allow students build software to various components of a GPS receiver. By the end of the course students have developed all of the components to complete the GPS receiver and be able to take raw signal data from a GPS antenna and process the data to calculate user positions

Why take the class
- Always wanted to understand how GPS works
- Application to a wide range of systems
    - Navigation
    - Radars
    - Wireless Technologies
- Build up more expertise in systems engineering, signal processing, and controls
- Resume builder
    - Huntsville, Eglin, etc are always looking for students with navigation and GPS knowledge
- Feel like you have not gotten enough exposure to MATLAB

For more information or questions contact:
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