Fall 2009

Updated 7 April 2009: This list is mostly complete, with the exception that for a few courses, instructors are unknown though the course will be offered.

AERO 345 [Girard]

AERO 540 [Bernstein]

AERO 575 [McClamroch]

AERO 586 [Atkins]

EECS 460 [Del Vecchio]

EECS 461 [Freudenberg]

EECS 498 [Olson]

EECS 501 [??]

EECS 560 (AERO 550) (ME 564) [Grizzle]

EECS 662 (ME 662) [Meerkov]

MATH 658 [Bloch] Nonlinear Dynamics, Geometric Mechanics and Control (see description next page)

ME 360 [Tilbury, Odham]

ME 461 [Ulsoy]

ME 560 [Stein]

ME 569 [Stefanopoulou]

NA590 [Eustice] (Special Topics = New Course) *Introduction to Probabilistic Mobile Robotics:* Theory and application of probabilistic techniques for autonomous mobile robotics. Topics include probabilistic state estimation; stochastic representations of the environment; motion and sensor models for mobile robots; algorithms for mapping, localization, and simultaneous localization and mapping; visual-SLAM; data association; planning and control in the presence of uncertainty; application to autonomous marine, ground, and air vehicles.

MATH 658. Nonlinear Dynamics, Geometric Mechanics and Control. Prerequisite: a course in differential equations (3 credits). This course treats aspects of the modern theory of nonlinear dynamics and ordinary differential equations as applied to problems in geometric mechanics, Hamiltonian and nonholonomic systems (systems with nonintegrable constraints), nonlinear stability theory and nonlinear control theory. The role of symmetry and reduction is discussed as well as topics such as the least action principle, integrability, symplectic and Poisson geometry, and controllability and accessibility on manifolds. Text: A. Bloch, Nonholonomic Mechanics and Control, Springer Verlag (required). Other books will be referenced as well as the primary mathematical literature.

For more information on this course, contact the instructor: *Anthony M. Bloch. Office: 4842 East Hall. Tel: 647-4980 Email: abloch@umich.edu*
Webpage: http://www.math.lsa.umich.edu/~abloch

EECS 498: Autonomous Robotics Laboratory (F2009)

General Information

- Lecture: 9:30MW
- Lab: 10:30MW
- Prerequisites: EECS280 or equivalent programming experience
- Units: 4 *(This course qualifies as an upper level computer science elective.)*
- Textbook: TBD
- Staff
  - Prof. Edwin Olson, (ebolson@umich.edu). Office hours: TBD, or by appointment, in 3737 CSE.
  - Teaching Assistant: TBD
  - Lab Assistant(s): TBD

Syllabus

Course Objective

This course will provide students with essential theoretical background and hands-on experience in central topics in robotics. These include: kinematics, inverse kinematics, sensors and sensor processing, and motion planning. Teams of students will explore these subjects through a series of challenge-themed laboratory exercises. Successful students will develop a pragmatic understanding of both theoretical principles and real-world issues, enabling them to design and program robotic systems incorporating sensing, planning, and acting.

We expore these topics from a computer science perspective, but we will also cover critical robotics topics that are often omitted from computer science curricula. These may include, for example, electrical circuits, control systems, Kalman filters, mechanics, and dynamics. Specialized computer science topics such as embedded systems programming, real time operating systems, artifical intelligence, etc., may also make appearances. No background is assumed in these areas.

The course is intended for upper-level computer science undergraduates, though any one with the appropriate background is welcome.

http://www.eecs.umich.edu/~ebolson/courses/F09_498/

Mathematics 658

Nonlinear Dynamics, Geometric Mechanics and Control

Instructor: Anthony M. Bloch.

Office: 4842 East Hall. Tel: 647-4980 Email: abloch@umich.edu

Webpage: http://www.math.lsa.umich.edu/˜ abloch

Fall 2009, TTh10–11.30

This course will discuss aspects of the modern theory of nonlinear dynamics and ordinary differential equations as applied to problems in geometric mechanics, Hamiltonian and nonholonomic systems (systems with nonintegrable constraints), nonlinear stability theory and nonlinear control theory. The role of symmetry and reduction will be discussed as well as topics such as the least action principle, integrability, symplectic and Poisson geometry, and controllability and accessibility on manifolds.

Text: A. Bloch, Nonholonomic Mechanics and Control, Springer Verlag. Other books will be referenced as well as the primary mathematical literature.

Prerequisite: a course in differential equations.

Grading: The course grade will be based mainly on completion various problem sets and general class participation.