ES456 Autonomous Vehicles

Summary: This course is an introduction to the fundamentals of autonomous vehicles, an area of increasing military significance as such vehicles are gaining improved and useful capabilities. The emphasis of the course is on navigation and vehicle dynamics. Unique characteristics of each of the major classes of vehicles – aircraft, ground vehicles, surface craft, and submerged vehicles are addressed. The course includes a series of guest speakers from government and industry, and usually a field trip.

Credits: 2-2-3

Prerequisites: ES418 or ES450, or department chair approval

Topics
- Coordinate frame transformations for translational and rotational motion
- Characteristics of common navigation sensors
- Rigid body dynamics
- Characteristics of ground, air, and marine vehicles

Laboratory Hardware:
- Navigation sensors: compass, inertial measurement unit, GPS
- Wheeled and hovering vehicles
- REMUS autonomous underwater vehicle

Sample Lab Exercises
- Compass characteristics and errors
- Model / program a model hovercraft to follow a desired heading.

Projects:
- The course culminates with planning and executing a mission with an autonomous system currently in use with the U.S. Navy.