

## ESS472: Rockets and Instrumentation (2crs; Max of 4 crs)

Hands-on course for the development rockets and their instrumentation. Students will participate in the building, launching and recovery of a high-power model rocket from Eastern Washington and/or a larger rocket launch capable of going supersonic. Students will study and utilize current technologies and science involved space engineering and sciences to launch their own high power rocket and payload. Students will learn to collaborate with individuals across engineering and science disciplines to build, launch and analyze data from the launch in a team environment on deadline driven projects.

### Fall Qtr Curriculum:

- Week 1: Review of Rocket Fundamentals – drag, stability: center of pressure, center of mass
- Week 2: Commercial Rocket System- Fins, nozzles, motors, thrust curves
- Week 3: Solid versus Hybrid Rocket Motors – how they work, advantages and disadvantages
- Week 4: Radio Transmitters and Receivers;
- Week 5: Atmospheric conditions and height profiles;
- Week 6: Science objectives and rocket construction
- Week 7: Rocket Launch, L1 Certification
- Week 8: Data Acquisition and Analysis
- Week 9: System Engineering Approaches for High Altitude Rocket
- Week 10: Trade Studies

### Win Qtr Curriculum:

- Week 1: Define Rocket (engine,size performance) and Payload
- Week 2: Design Telemetry and Command/Control Systems
- Week 3-5: Build Telemetry and Command/Control Systems
- Week 6-7: Build L2 Rocket system
- Week 8-9: Integrate telemetry and payload into rocket and Command Control System on Gondola system
- Week 10: Verify system operation.
- Spring Break: Fly balloon and launch rocket in Nevada and attempt recovering

### Students:

- Component design
- Participate in the fabrication of rocket and/or electronic packages
- *All-Day and/or week field trip to launch site*
- Error Analysis

Prerequisite: PHYS 122; either PHYS 334 or ESS 205, or instructors permission

Grading:

- Class presentation of component developments (30%)
- Operation status of rocket and payload at launch time (30%)
- Participation in launch (20%)
- Final report (20%)