

MAE 4160/4161/5160: Spacecraft Technology and Systems Architecture

Prerequisite(s): MAE 3260 and MAE 3060 or permission of instructor.

A survey in contemporary space technology from satellite subsystem design through launch and mission operations, focusing on the classical subsystems of robotic and human-rated spacecraft, rockets, planetary rovers, and habitats, and with an emphasis on issues of spacecraft-system architecture and design. Includes a senior-design project option as MAE 4161. Includes an MEng project option as MAE 5160. Topics covered include subsystem technologies and the systems-engineering principles that tie them together into a spacecraft architecture. Subsystem technologies discussed include communications, thermal subsystems, structure, guidance/navigation/control, spacecraft power, space propulsion, payloads (remote sensing, insitusensing, human life support), entry/descent/landing, surface mobility, and flight-computer hardware and software. The final project consists of architecting a complete spacecraft system with appropriate subsystems, with designs supported by parametric analysis and simulation. Discussions of current problems and trends in spacecraft operation and development. MAE 4160 students (3 credits) engage in a 2-4 person space-system design project. MAE 4161 students undertake this project with the reporting expectations of a senior-design project. MAE 5160 students (4 credits) also conduct an in-depth study of a space-technology problem to be integrated with a space-system design project.

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