SPACE RESOURCES (SPRS)

SPRS501. SPACE RESOURCES FUNDAMENTALS. 3.0 Semester Hrs.
(I, II) This course provides an overview of the space resources field, including the current knowledge of available resources in the Solar System, extraction and utilization systems under development, economic and technical feasibility studies, legal and policy issues, and space exploration architectures that may be enabled by utilizing extraterrestrial resources in the near future. The course will build broad knowledge and develop confidence in problem solving in the space resources field. Prerequisite: Working knowledge of physical sciences, engineering fields, or economics at an advanced undergraduate level, with basic numerical analysis skills using a programming language or spreadsheet calculations. 3 hours lecture; 3 semester hours.

SPRS502. SPACE SYSTEMS ENGINEERING. 3.0 Semester Hrs.
(I, II) This course conveys the fundamentals of the systems engineering process as applied to large, complex space systems. It is intended for graduate students with various backgrounds. The students will become familiar with full scope of the systems engineering process from requirements definition, system design, system analysis through system verification. The process will be illustrated with real-world examples from current space systems with an emphasis on systems relevant to the development of space resources. Co-requisite: SPRS501. 3 hours lecture; 3 semester hours.

SPRS503. SPACE RESOURCES GRADUATE SEMINAR. 1.0 Semester Hr.
(I, II) The Space Resources Graduate Seminar will engage graduate students in the program with current research and developments related to space resources assessment, extraction, and utilization. The course, which will meet once a week, will provide students opportunities to engage with invited guest speakers who are industry, government, and academic leaders in the space resources field. Students will be asked to prepare a few short reports on research related to guest speaker seminars. Students will also prepare and deliver at least one technical presentation on their own work and/or that of others and lead a discussion on the topic of interest. This course will instill knowledge and confidence in the students to enable them to critique, articulate, and present concepts and relevant research and development in space resources. Co-requisite: SPRS501. 1 hour seminar; 1 semester hour.

SPRS591. SPACE RESOURCES DESIGN AND ANALYSIS I. 2.0 Semester Hrs.
(I, II) This course will provide graduate students in the program with directed team-based project learning by exploring the design, planning, and analysis of a mission, process, or systems for space resources assessment, extraction, and/or utilization. The course will meet formally twice a week for one hour and include a 10-15 minute discussion on relevant design aspects of space mission, processes, and/or systems. In this regard, it will build on content learned in the Space Resources Fundamental and Space Systems Engineering courses. Students will collaborate in multi-disciplinary teams of up to 5 students. Teams will be advised by the course instructor with significant industrial aerospace design experience and supported by faculty affiliated with the Space Resources program from relevant disciplines on campus. For teams with students in space resource economics, detailed economic analysis will be incorporated into those projects. Student teams will prepare a preliminary design, planning and analysis report early in the semester, one interim progress report, and a final report and project presentation. This course will guide the students and teach them good design and analysis practices and principles for missions and/or systems related to space resources. Co-requisites: SPRS501 and SPRS502. 2 hours lecture; 2 semester hours.

SPRS592. SPACE RESOURCES DESIGN AND ANALYSIS II. 3.0 Semester Hrs.
(I, II) The Space Resources Design and Analysis II course will provide graduate students in the MS-NT and Ph.D. degree programs in Space Resources with an independent design and analysis project. This project, which will be guided by the course instructor and a technical advisor, will enable the student to delve deeply into a particular system related to space resources prospecting, extraction, processing, and/or utilization. As much as possible, projects will be coordinated with industrial or government agency partners who are collaborating with the program. The course will involve weekly meetings with the course instructor and all students in the course where ideas are exchanged and progress discussed within the context of design and analysis principles learned in the pre-requisite course SPRS591. Students will be partnered with a faculty member affiliated with the Space Resources program. The student will prepare a final report and presentation to present to industry collaborators, space resources faculty, and other students in the course. The final report and/or presentation as appropriate will be converted to a journal or conference publication and/or presentation and resources from the program will support student costs for publishing and/or presenting the work. Prerequisite: SPRS591. 3 hours lecture; 3 semester hours.