Space and Planetary Sciences (SPAC)

Larry Roe
Graduate Coordinator
STON F50
479-575-3750
Email: lar@uark.edu

Space and Planetary Sciences Website (http://spacecenter.uark.edu)

Degree Conferred:
M.S., Ph.D. in Space and Planetary Sciences (SPAC)

Program Description: The program provides advanced course work and research experience for persons seeking a career in the academic, government, private, or military sectors of space and planetary sciences or associated technologies.

Primary Areas of Faculty Research: Astronomical processes, geological processes on planetary surfaces, planetary atmospheres, mission instrumentation and design, astrobiology, applications to Mars, Venus, Pluto, and ice worlds.

M.S. in Space and Planetary Sciences

Admission to Degree Program: Students wishing to apply for admission to the graduate degrees in space and planetary sciences should contact the Space and Planetary Science Center’s graduate coordinator at jcdixon@uark.edu. Applicants should prepare to have transcripts, two letters of recommendation, and a statement of purpose sent to the center. Applicants are encouraged to submit scores from the Graduate Record Examination, including the writing score.

Basic Requirements for the Master’s Degree: At least 24 semester hours of courses plus at least six hours of SPAC 600V are required for a total of at least 30 hours beyond the baccalaureate degree. Students are required to take the following courses:

Non-Core Courses
SPAC 5211  SPAC Proseminar  1

Core Courses
Select three of the following:  3

- SPAC 5033  Astrophysics I: Stars and Planetary Systems
- SPAC 5313  Planetary Atmospheres
- SPAC 5413  Planetary Geology
- SPAC 5553  Astrobiology
- SPAC 5613  Astronautics

Space and Planetary Electives
(see list below) – Must take at least three courses (10 hours).  10
Substitutions may be made with the approval of the committee.

Other Electives
SPAC 5161  Seminar (must take every semester)  4

Thesis
SPAC 600V  Master’s Thesis  6
Total Hours  24

NOTE: The student’s committee consists of at least four faculty members; at least three of these must be from the space center faculty, drawn from three different departments, and these must include the graduate advisor and the chair of the committee. One member of the committee should be from outside of the space center.

Every student must register for a minimum of one credit hour of SPAC 600V or 700V in each term during which the student is away from campus and doing thesis or dissertation research. The number of 4000-level courses allowed in a program is limited to two and committee approval is required.

Students should also be aware of Graduate School requirements with regard to master’s degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#mastersdegreetext).

Ph.D. in Space and Planetary Sciences

Admission to Degree Program: Students wishing to apply for admission to the graduate degrees in space and planetary sciences should contact the Space and Planetary Science Center’s graduate coordinator at jcdixon@uark.edu. Applicants should prepare to have transcripts, two letters of recommendation, and a statement of purpose sent to the center. Applicants are encouraged to submit scores from the Graduate Record Examination, including the writing score.

Requirements for the Doctor of Philosophy Degree: Students are required to take a minimum of 72 hours beyond the baccalaureate degree to include a minimum 34 hours of required course work and 18 hours of SPAC 700V. Course requirements are given below.

Non-Core Courses

- SPAC 5211  SPAC Proseminar  1
- SPAC 5123  Internship  3

Core Courses
Select four of the following:  12

- SPAC 5033  Astrophysics I: Stars and Planetary Systems
- SPAC 5313  Planetary Atmospheres
- SPAC 5413  Planetary Geology
- SPAC 5553  Astrobiology
- SPAC 5613  Astronautics

Space and Planetary Electives
(see list below) – Must take at least three courses. Substitutions may be made with the approval of the committee.  9

Other Electives
SPAC 5161  Seminar (must take every semester)  4

Dissertation
SPAC 700V  Doctoral Dissertation  18
Total Hours  47

Space and Planetary Electives

Note: Other courses may count as electives with the approval of the student’s research adviser and committee. No more than two 4000-level courses may be counted toward the Ph.D. degree.

Planetary Astronomy

- ASTR 5043  Astrophysics II: Galaxies and the Large-Scale Universe  3
- CHEM 5263  Nuclear Chemistry  3
- CHEM 5273  Cosmochemistry  3
- PHYS 5513  Atomic and Molecular Physics  3
Planetary Geology
GEOS 5123  Stratigraphic Principles and Practice  3
GEOS 5423  Remote Sensing of Natural Resources  3
GEOS 560V  Graduate Special Problems  2-6

Planetary Atmospheres
GEOS 5353  Meteorology  3
GEOS 5363  Climatology  3
GEOS/ENDY  Global Change  3

Origin and Evolution of Life
BIOL 4233  Genomics and Bioinformatics  3
BIOL 4263  Cell Physiology  3
BIOL 4353  Ecological Genetics/Genomics  3
BIOL 5463  Physiological Ecology  3
CHEM 5813  Biochemistry I  3
CHEM 5843  Biochemistry II  3

Astronautics and Orbital Mechanics
CSCE 5043  Advanced Artificial Intelligence  3
MEEG 4233  Microprocessors in Mechanical Engineering I: Electromechanical Systems  3
MEEG 5833  Aerospace Propulsion  3
MEEG 5273  Electronic Packaging  3

Additional Requirements: Students are required to complete a thesis or dissertation describing original research work in the space and planetary sciences that must be presented to and successfully defended before their committee. In addition, Ph.D. students must pass a candidacy examination.

The Ph.D. candidacy examination is administered by the student’s committee and is designed to test the student’s ability to assimilate, integrate and interpret material learned in the core required courses:

SPAC/ASTR  Astrophysics I: Stars and Planetary Systems  3
SPAC/GEOS  Planetary Atmospheres  3
SPAC 5413  Planetary Geology  3
SPAC/CHEM/BIOL  Biochemical Evolution  3
SPAC 5613  Astronautics  3

While at the same time having a depth of understanding in the area of the student’s research. Thus the candidacy examination will be in two parts: (1) a 2500-word integrative essay on a theme chosen by the committee, and (2) an oral defense of the thesis before the committee. Part (1) will be assigned six weeks before the candidacy defense and shall be presented to the committee two weeks before that defense. The defense will be held at a date determined by the committee but usually before the end of the student’s second year in graduate school. The committee will judge the examination as pass/fail and in the case of failure – and at the discretion of the committee – a second attempt to pass the qualifying examination is permitted within a period of time determined by the committee.

Students should also be aware of Graduate School requirements with regard to doctoral degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#phdandedddegreeext).

Courses
SPAC 5033. Astrophysics I: Stars and Planetary Systems. 3 Hours.
Stellar structure and evolution, the properties of the solar system, and extrasolar planetary systems. (Typically offered: Fall Odd Years)
This course is cross-listed with ASTR 5033.

SPAC 5111L. Space and Planetary Lab. 1 Hour.
Laboratory course in space and planetary sciences consisting of experiments in the five major areas of space and planetary sciences: planetary astronomy, planetary geology, planetary atmospheres, origin and evolution of life and orbital mechanics and astronautics. Intended for students enrolled in the graduate programs in space and planetary sciences. (Typically offered: Fall)

SPAC 5123. Internship. 3 Hours.
Internship for graduate students in the space and planetary sciences graduate degree programs and concentrations in the graduate programs in physics, biology, geosciences and mechanical engineering. Students conduct a phase of their research, normally for one month, at a national or industrial laboratory in North America or overseas. (Typically offered: Fall and Spring)

SPAC 5161. Seminar. 1 Hour.
Seminars organized by the Arkansas-Oklahoma Center for Space and Planetary Sciences covering topics on the cutting edge of research in the field for graduate students conducting research with a faculty member in the space and planetary sciences as part of their graduate degree programs or concentrations in the graduate programs in physics, biology, geology, geography and mechanical engineering. (Typically offered: Fall and Spring)

SPAC 5411. SPAC Proseminar. 1 Hour.
Introductory course consisting of discourses and case studies in ethics, communications and public policy in the administration of space and planetary sciences. Prerequisite: Admission to program or instructor consent. (Typically offered: Spring)

SPAC 5613. Planetary Atmospheres. 3 Hours.
Origins of planetary atmospheres, structures of atmospheres, climate evolution, dynamics of atmospheres, levels in the atmosphere, the upper atmosphere, escape of atmospheres, and comparative planetology of atmospheres. (Typically offered: Summer)

SPAC 5413. Planetary Geology. 3 Hours.
Exploration of the solar system, geology and stratigraphy, meteorite impacts, planetary surfaces, planetary crusts, basaltic volcanism, planetary interiors, chemical composition of the planets, origin and evolution of the Moon and planets. (Typically offered: Spring Even Years)

SPAC 5513. Biochemical Evolution. 3 Hours.
Abiotic synthesis of biomolecules on Earth, the origin of cells; genetic information, origin of life on Earth and elsewhere, evolution and diversity, ecological niches, bacteria, archaea, and eukaryotic, novel metabolic reshaping of the environment, life being reshaped by the environment, molecular data, and evolution. Prerequisite: CHEM 5813. (Typically offered: Spring Odd Years)
SPAC 5553. Astrobiology. 3 Hours.
Discusses the scientific basis for the possible existence of extraterrestrial life. Includes origin and evolution of life on Earth, possibility of life elsewhere in the solar system (including Mars), and the possibility of life on planets around other stars. Prerequisite: Instructor consent. (Typically offered: Spring Even Years) This course is cross-listed with BIOL 5553.

SPAC 5613. Astronautics. 3 Hours.
Study of spacecraft design and operations. Prerequisite: Admission to program or instructor consent. (Typically offered: Irregular)

SPAC 600V. Master's Thesis. 1-10 Hour.
Master's thesis. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

SPAC 700V. Doctoral Dissertation. 1-18 Hour.
Doctoral dissertation. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.