Space and Planetary Sciences (SPAC)

Faculty
Steve K. Boss, Professor
Vincent Francois Chevrier, Assistant Professor
John C. Dixon, Professor
Po-Hao Adam Huang, Associate Professor
Mack Ivey, Associate Professor
Daniel John Kennefick, Associate Professor
Julia Dusk Kennefick, Associate Professor
Timothy Alan Kral, Professor
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Degree Conferred:
M.S., Ph.D. (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, Mars: near-surface processes and biological investigations, and ice moons — particularly Titan — and surface processes.

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 (Sp) 1

Core Courses
Select three of the following: 3
SPAC 5033 Stars and Planetary Systems (Odd years, Fa)
SPAC 5313 Planetary Atmospheres (Irregular)
SPAC 5413 Planetary Geology (Even years, Sp)

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

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

Thesis
SPAC 600V Master's Thesis (Sp, Su, Fa) 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/#mastersdegreestext).

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 (Sp) 1
SPAC 5123 Internship (Sp, Fa) 3

Core Courses
Select four of the following: 12
SPAC 5033 Stars and Planetary Systems (Odd years, Fa)
SPAC 5313 Planetary Atmospheres (Irregular)
SPAC 5413 Planetary Geology (Even years, Sp)
SPAC 5553 Astrobiology (Even years, Sp)
SPAC 5613 Astronautics (Irregular)

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

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

Dissertation
SPAC 700V Doctoral Dissertation (Sp, Su, Fa) 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
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/#phdandddegreestext).

### Courses

**SPAC 5033. Stars and Planetary Systems (Odd years, Fa). 3 Hours.**

Stellar structure and evolution, the properties of the solar system, and extrasolar planetary systems.

**SPAC 5111L. Space and Planetary Lab (Fa). 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.

**SPAC 5123. Internship (Sp, Fa). 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.

**SPAC 5161. Seminar (Sp, Fa). 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.

**SPAC 5211. SPAC Proseminar (Sp). 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.

**SPAC 5313. Planetary Atmospheres (Irregular). 3 Hours.**

Origins of planetary atmospheres, structures of atmospheres, climate evolution, dynamics of atmospheres, levels in the atmosphere, escape of atmospheres, and comparative planetology of atmospheres.

**SPAC 5413. Planetary Geology (Even years, Sp). 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.

**SPAC 5513. Biochemical Evolution (Odd years, Sp). 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.

**SPAC 5553. Astrobiology (Even years, Sp). 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.

This course is cross-listed with BIOL 5553.

**SPAC 5613. Astronautics (Irregular). 3 Hours.**

Study of spacecraft design and operations. Prerequisite: Admission to program or instructor consent.
SPAC 600V. Master's Thesis (Sp, Su, Fa). 1-10 Hour.
Master's thesis. May be repeated for degree credit.

SPAC 700V. Doctoral Dissertation (Sp, Su, Fa). 1-18 Hour.
Doctoral dissertation. May be repeated for degree credit.