Arkansas Center for Space and Planetary Sciences

University of Arkansas

GRADUATE STUDENT HANDBOOK

Doctor of Philosophy and Master of Science
in Space and Planetary Sciences

General Information, Admission and
Degree Requirements

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The Arkansas Center for Space and Planetary Sciences
http://spacecenter.uark.edu

The Graduate School at the University of Arkansas
http://grad.uark.edu

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INTRODUCTION

The goal of the graduate program in the Arkansas Center for Space and Planetary Sciences ("the Space Center") is to prepare its students for advanced roles in the space and planetary sciences community (academia, industry, and government) through a combination of planned coursework and research activities in a university environment that values the development of well-rounded and innovative individuals.

An essential feature of this program is its interdisciplinary nature, being organized in partnership with six academic departments: Biological Sciences, Chemical Engineering, Chemistry and Biochemistry, Geosciences, Electrical Engineering, Mechanical Engineering and Physics. Thus many elements of our graduate program are intended to integrate disciplines and encourage team skills in the science and engineering areas. The graduate degree is not intended to be restrictive or to force specialization, but should broaden the intellectual abilities and experience of candidates for an advanced degree and to enhance their opportunities in research, teaching, management, and science and engineering practices in space-based endeavors of the nation. The student's graduate committee of experienced faculty in the space and planetary sciences (drawn from at least three participating departments) will assist in the definition of a diversified program to ensure a strong preparation for the practicing space and planetary scientist.

Appropriate programs of advanced courses, examinations, and research are required for all for advanced degree candidates: Progress is monitored by the students' committee through the annual review process. The main elements of the degree include:

Research: Each student will perform research as part of a team; students work closely with one or more supervising professors and a thesis committee that is drawn from three of the participating departments in the Space Center, thus underscoring the integrative, interdisciplinary nature of SPAC research. They perform original research on a topic of importance in the field that results in conference attendance and publication in peer reviewed journals. Students participate in the planning, managerial, budgetary, experimental and reporting aspects of their research projects. Primary areas of faculty research are: astronomical processes, geological processes on planetary surfaces, planetary atmospheres, mission instrumentation and design, Mars: near-surface processes and biological investigations, surface processes and asteroid sample return.

Coursework: Coursework is comprised of general courses (seminars, internships, a laboratory course and research courses) and core courses. There are five core courses reflecting the areas of faculty research. Specific requirements for coursework are determined individually for each student by their major professor and thesis committee, depending on their goals and the needs of their research program. The MS requires completion of a minimum of 24 hours of coursework plus research and the PhD requires completion of a minimum of 34 hours of coursework plus research.

PhD Candidacy Examination: This 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 while at the same time demonstrating the student's depth of understanding in their area of research.

Teaching: All graduate students are required to fulfill some teaching responsibilities as a part of their graduate training. This can be either as part-time teaching assistants for classes or as supervisors of undergraduate research or, preferably, both.

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ADMISSION

To attend graduate school in the Arkansas Center for Space and Planetary Sciences, applicants must be accepted by both of the following organizations:

1. The Arkansas Center for Space and Planetary Sciences (the “Space Center”)
2. The Graduate School of the University of Arkansas (the “University”)

Admission Requirements

The Space Center’s admission requirements are:

- A grade point average of 3.0 out of 4.0 from an accredited science or engineering program. If the student's undergraduate institution uses a grade scale not based on 4.0, the Space Center will convert the grades to a 4.0 scale.

- The GRE is required. Scores should be sent directly to the University of Arkansas at Fayetteville, institution code 6866.

- If you do not have a bachelor’s degree from a U.S. university, you’ll need a minimum score on one of the following English proficiency exams:
  TOEFL paper exam: 550
  TOEFL computer exam: 213
  iBT computer exam: 80
  IELTS: 6.5
  The test must have been taken within two years prior to application.

- To enter the graduate program, a majority vote by the faculty of the Arkansas Center for Space and Planetary Sciences is required.

For questions about admissions, contact the Graduate Coordinator, John C. Dixon, at jcdixon@uark.edu.

Application Procedure

Application to our graduate program is a two-step process:
Step 1. Apply to the Space Center.
Step 2. If you are accepted by the Space Center, apply to the University.

If you are accepted by the Space Center in Step 1, you will almost certainly be accepted by the University in Step 2.

Step 1: Application to the Space Center

Fill out the on-line form at http://spacecenter.uark.edu/92.htm

Type in as much as you want into each field, there is no limit. We want to know all about you so tell us all you can.

Send the following materials to the Space Center's Graduate Coordinator:

1. Your transcripts from all colleges and universities you've attended. These can be unofficial transcripts or even scans. You don't need to send official copies until Step 2.

2. A statement of purpose about who you are, why you want a graduate degree in space sciences, and what you plan to do with it.

3. Letters of recommendation. At least two but more is better.

4. Any GRE, TOEFL and other test scores you want the admissions committee to see. Also, any certificates or diplomas. Again, more is better.

5. A complete resume.

Send all these materials to:

Dr. John C. Dixon
Director, Space and Planetary Sciences
Department of Geosciences
University of Arkansas
Fayetteville AR 72701

Email: jcdixon@uark.edu
Phone: 479-575-5808

Please get all this in to me by January 15 to be considered for the following Fall semester. Late or incomplete applications will not be accepted. The Space Center's Graduate Studies Committee will evaluate your application materials sometime in late January. If you are accepted, then we'll discuss you applying to the Graduate School.

If you have any questions about this process or your status, email Dr. Dixon at jcdixon@uark.edu.

Step 2: Application to the Graduate School

After Dr. Dixon has emailed you that you have been accepted by the Space Center, you will apply to the University through the Graduate School Office. Do not go to this step before being accepted to the Space Center.

To apply, start here: http://grad.uark.edu/future/applying/index.php

The Grad School's website: http://grad.uark.edu/

You can email them at: gradinfo@uark.edu

And, here are the instructions for applying: http://grad.uark.edu/forms/student/appl-instruct.pdf

The Graduate School requires a $40 application fee for U.S. students or a $50 fee for international students but the Space Center will pay this for you if you were accepted in Step 1.

You will submit various official documents to the Graduate School in this step, including transcripts, GRE scores, English language scores, and letters of recommendation. The scores on these documents must match exactly those that you referred to in Step 1.

Once the Graduate School Office accepts you, they will contact you by email and by letter. Dr. Dixon will also contact you again from the Space Center to see if you accept or reject our offer to come to graduate school here.

Master's versus a PhD in Space and Planetary Sciences?

The University of Arkansas offers two advanced degrees in space and planetary sciences, the MS and the PhD. In addition, several of our partnering departments offer their departmental programs with concentrations in space and planetary science. These are described elsewhere. The essential difference between the master's and the doctoral degree in space and planetary sciences, is that the master's degree is a degree by coursework with minimal research element, while the doctoral degree is mainly a research degree with coursework only marginally more demanding than that of the master's degree.

The philosophy in the Arkansas Center for Space and Planetary Sciences is that the nation's need is for doctoral candidates in space and planetary science and the opportunities for candidates with the master's degree are fairly minimal. Thus we have tailored our program so that students who enter the master's program can easily transfer to the doctoral program when they have the necessary academic background and are personally prepared, while those who decide to graduate with master's can do so smoothly.

FINANCIAL ASSISTANCE

The Space Center offers financial support as follows: Financial support is available through a mixture of teaching (TA) and research (RA) assistantships as determined by the student and their research advisor in collaboration with the space center. Students are expected to hold a TA for at least one academic year as part of their education. Full assistantships cover stipend and tuition but cannot cover university-mandated fees, which amount to about $325 per semester. The student must pay these themselves. This support will be awarded for up to four years contingent upon satisfactory progress towards the degree. In addition, there are also Doctoral Academy fellowships and Distinguished Doctoral fellowships that the Space Center can request for students with the appropriate credentials.

The current rate for full assistantships is approximately $20,000 per academic year depending on the precise source of funds and this is usually in the forms described above. Students with appropriate credentials may receive higher amounts.

The Space Center is committed to offering every benefit available to each student to maximize educational opportunities. There are annual supplemental funds available to every graduate student in our programs to help cover expenses for attendance at professional meetings. The Graduate School currently provides up to $1,000 per year and the Space Center also has additional sources of travel funds. In order to relieve financial obligations, the university subsidizes health insurance for all students on an assistantship; full health insurance costs average around $500 per year currently.

Teaching Assistantships

Teaching assistantships enable the development of additional professional skills, consolidation of knowledge and understanding, and can be intellectually stimulating. Most major professors require all their students to spend some time in a teaching assistantship as part of their overall professional development. The Space Center would not place a student in a teaching position for which they were not qualified, and normally the department would be the same or similar to the student's undergraduate department. However, the Space and Planetary Sciences Program tends to attract highly interdisciplinary individuals who enjoy the challenge of teaching in a department different from their undergraduate department, especially if it strengthens their background for their chosen research area.

The Space Center has access to teaching assistantships through its partnering departments. The level of this departmental support depends on rates that have been set by the department which, in turn, are governed by the competitive forces in that field.

Research Assistantships

A research assistantship allows students intense immersion in research and the research process of reporting and publishing, and high quality in the research element of their graduate program. Often these are allocated to students who are in the later stages of their degree program.

The Space Center has a number of research assistantships. In addition, many members of faculty have research funds that they will use to support students in their research programs. Again, when necessary the Space Center will supplement faculty RA's to give students the minimum Space Center stipend.

Walton Fellowships

There are two graduate fellowships that the Space Center can request for students with the appropriate credentials who will be registered for the PhD program. As with TA's and RA's these forms of support are for four years contingent on satisfactory progress towards the degree.

Doctoral Academy Fellowships (DAF) – an additional $10,000 per year plus tuition

GPA: 3.50/4.00

GRE: verbal plus quantitative score of at least 320 with a GRE writing score of 5.0 or higher

Distinguished Doctoral Fellowships (DDF), an additional $22,000 per year plus tuition

GPA: 3.65/4.00

GRE: verbal plus quantitative score of at least 326 with a GRE writing score of 5.0 or higher

You need to apply by January 15 (for fall admission) to be considered for a DDF. A DAF may be awarded at any time and has no deadline.

Procedure for Applying for Financial Assistance

Applicants should indicate on the space center on-line application form if they will require financial assistance. No additional forms are required. Financial assistance decisions are made by the Faculty of the Space Center, the Chairs of partnering departments, or some combination, but will be coordinated and communicated to the applicant by the Space Center.

Most forms of financial assistance are competitive and the level of competition increases throughout the application season. Applicants are therefore advised to have application materials to the Space Center offices as early as possible but no later than the deadlines given on page 5.

Employment Outside of the University

Graduate school is a challenging full-time commitment with rewards on many levels. However, it also requires considerable commitment of fiscal resources by the University and professional resources by the advisor and the Space Center. Therefore, no student receiving a teaching assistantship or research assistantship may work outside the University without written permission by the graduate advisor and the Director of the Space Center, which is seldom given. Students in violation of this understanding will immediately lose financial aid and may be terminated from the program.

THE PATHWAY TO THE DEGREE

There are certain milestones and objectives that must be met for progress to be considered acceptable.

Advisory Committee

The student's committee consists of at least four faculty members, which includes the student's advising professor. At least three of these must be from Space and Planetary Sciences faculty, drawn from at least three participating departments. One member of the committee, but no more than one, should be from outside the Space Center.

Towards the close of the student's **first semester** the student should:

- Arrange for a graduate advisor
- Arrange for a graduate advisory committee

Coursework (Classroom)

Classroom coursework should be completed as soon as possible so you can concentrate on your research. It is the student's responsibility, under the advice of their committee, to ensure that this coursework is completed in a timely fashion. A cumulative GPA of at least 3.0 is necessary in order to graduate from the program. Any semester in which the student's semester GPA is below 3.0 does not constitute acceptable progress and grades must be improved to stay in the program. Two consecutive semesters with averages below 3.0 may be grounds for termination from the program.

Research

The appropriate rate of progress in research depends on many circumstances such as funding, equipment issues, and the risks taken in the project's scope. Good research pushes the envelope of knowledge and technique, and this can sometimes cause unexpected delays. The first step is the determination of a research project.

During the student's **second semester**:

- Students should present their research proposal to their committee.

The entire summer is treated as one semester. After the proposal is determined, acceptable progress in research activities will be defined by the student's graduate advisor and the Graduate Advisory Committee. There are many potential problems in any research program that can cause the student's intended schedule to be unavoidably delayed. If this is the case, the student's graduate advisor will inform the committee and these factors will be taken into consideration.

The Annual Meeting of the Student's Committee

Students meet with their Committee at least once a year, and an annual report (Annual Graduate Student Academic Review Form) is submitted by the committee chair to the director of the program by **April 15th.** Students should arrange this meeting for the spring semester.

That report should state whether progress is satisfactory and whether support is recommended for the following year. As mentioned earlier, continued financial support of any sort is contingent on this report being satisfactory. During the meeting, the student will receive feedback from the Committee intended to encourage the greatest level of accomplishment possible, but in the event of an unsatisfactory report the Committee will identify specific means whereby performance can be brought to acceptable standards. The Committee will evaluate coursework, research, safety practices, undergraduate teaching and, as needed, qualifying examinations and thesis/dissertation defenses. A second review will then be

scheduled six months after the annual meeting and if progress is still not adequate enrollment in the program will be terminated.

Students are advised that they will be involved in this type of evaluation procedure for most of their working lives, whether they are in industrial or academic institutions, so this should be considered practice for the student's future. The completion of degree programs in a timely manner is beneficial to the candidate, the Space Center, the University, and the sources that funded the research (see below).

Safety Practices

Space and Planetary Sciences research often involves handling and disposing of hazardous materials and handling potentially hazardous equipment. It is essential that the student learns to do this properly for their safety, for the safety of others, and as valuable training for the future. Each year, the student will receive instruction in safety practices as part of Graduate Seminar. The student will be expected to take what is learned in the seminar into the laboratory on a daily basis and to conduct research at or above a level of safety common in the U.S. Space industry. Violations of safety practices, whether or not they result in accidents or deliberate acts, may constitute unacceptable progress toward the degree. Serious violations will result in instant dismissal from the University.

Assisting in Undergraduate Teaching

Grading papers, overseeing laboratory sessions, and giving an occasional lecture when the professor is out of town are a necessary service to the Space Center, a good technical review for students, and good practice for a career in academia. All graduate students are required to participate in these activities.

Candidacy Examination

For the PhD program: This 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 while at the same time demonstrating the student's depth of understanding in their area of research. Thus the candidacy examination will be in two parts, (1) a 2500 word integrative essay on a theme chosen by their committee, and (2) an oral defense of the essay 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.

The candidacy examination will be administered before the end of the **fourth semester** early enough that the committee's recommendation can reach the Director of the Space Center before April 15th. At the discretion of the student's advisory committee, a failed qualifying examination may be retaken within a time period set by the Committee. Failure a second time will result in termination in the program.

For the MS program: Candidacy is equivalent to 12 hours of graduate coursework as per Graduate School requirements.

Time Limits

In the Program
There is a maximum length of time that the Graduate School will allow a student for the completion of their graduate degrees:

MS: 6 years PhD: 7 years

This time starts when the student first enters any graduate program at the University of Arkansas. The clock runs continuously even if the student takes leave of absence.

For Financial Aid
The Graduate School also has a limit on how long a student in residence can collect financial aid from any source:

Entering with bachelor's degree, leaving with MS: 2 years
Entering with bachelor's degree, leaving with PhD: 6 years

Entering with MS, leaving with PhD: 4 years

Residency

The Space Center requires students to remain in residency for the duration of their degree program.

COURSEWORK OVERVIEW

The coursework requirements are satisfied by a combination of Space Center (SPAC) courses and courses offered by the partnering departments. The specific requirements for the MS and PhD are described later in this document.

The selection of courses within the requirements of the program should be made by the student and advisor, and approved by the student's committee. Students must maintain a cumulative GPA of at least 3.0 in all courses to graduate. As a rule, it is advisable to complete classroom coursework as early as possible in the program.

In the event that the student has weaknesses that will jeopardize their success in the required coursework, the student's committee will determine deficiency courses that will remedy the situation. These are normally undergraduate courses, but, at the discretion of the student's committee and if these courses are at the 4000-level, they may carry credit towards the graduate degree (see below).

At the University of Arkansas undergraduate courses have 1000-4000 number designations and four letter designations that identify the department or program responsible for them (CHEM, chemistry; SPAC, space and planetary science). Graduate level classes are 5000 and 6000 level. The last digit of the four digit number indicates the number of credit hours. In the Space and Planetary Sciences Program, no more than two 4000 level courses can be used for graduate credit with the approval of the candidate's committee.

The complete University of Arkansas Schedule of Classes is at: http://registrar.uark.edu/465.php. A list of graduate-level courses suitable for students in the Space and Planetary Program is given in Appendix A.

General Courses

The general courses include a proseminar course, seminars, research, internships, and a laboratory course. The proseminar course is designed to develop personal and professional skills, foster an international perspective, and provide instruction on the responsible conduct of research. The laboratory course includes a lecture component and is designed to introduce students to the interdisciplinary nature of SPAC research and to nurture the ability to work in diverse teams. The internships will be with one of the Space Center's industrial partners or a collaborator at a national laboratory or university.

SPAC 5111L Space and Planetary Laboratory. All students in the graduate program in space and planetary science are required to take this course in the first fall semester in the program. It is designed to expose the students to research in general and laboratory work in at least three different partnering departments of the Space Center. Exception may be granted when a student has been recruited to work on a specific funded research project.

SPAC 5211 The Proseminar course. All students in the graduate program in space and planetary science are required to take this course in the first spring semester in the program.

SPAC 5123 Internship. PhD students and their advisors are required to arrange for the student to spend at least one month in a research environment, such as a national or industrial laboratory. They can obtain course credit for this by registering for SPAC 5123.

SPAC 5161 *Seminar*. This provides a structure for presenting work on the student's research to the student's peers and faculty. The seminar will provide a critical atmosphere for research and an exchange of ideas and constructive criticism is encouraged. All graduate students are required to register for and attend graduate seminars while in the program, and those with on-going research are expected to present a status report at least annually. Other topics may be presented by off-campus and on-campus guest lecturers.

Research Courses. These are required courses and the course enrolled in is specific to the degree being taken.

SPAC 600V (Master's Thesis) is required for candidates for the Master of Science degree in space and planetary sciences. MS students must take at least 6 semester hours of SPAC 600V.

SPAC 700V (Doctoral Dissertation) is required for candidates for the PhD program in space and planetary sciences. PhD students need at least 18 semester hours of SPAC 700V.

Space and Planetary Core Areas

There are five core areas in the Space and Planetary Sciences Graduate Program in each of which there is core required course and a number of elective courses. The five core areas are: planetary geology, planetary astronomy, planetary atmospheres, origin and evolution of life, and orbital mechanics and astronautics.

The five core required* courses are:

SPAC 5033 Planetary Systems
SPAC 5313 Planetary Atmospheres **
SPAC 5413 Planetary Geology
SPAC 5553 Astrobiology
SPAC 5613 Astronautics

* PhD candidates must take four of these five courses
MS candidates must take three of these five courses
** Presently not regularly offered

Space and Planetary Electives:

In addition to the general courses and core required courses, the candidate must select courses from their research area to add depth to their program of coursework. See Appendix A for a list of courses.

Coursework Loads

The minimum number of hours a student has to register for depends on the student's situation. These hours include all courses including classroom lecture courses, seminar, research, workshops, internship, laboratory, Master's Thesis and Dissertation.

Students on any kind of fellowship, such as a TA or an RA must take at least:

Spring or Fall Semesters:	6 hours minimum, 15 hours maximum
Total for Summer Semesters:	3 hours minimum, 8 hours maximum

For the spring or fall semesters, a course load of 9 hours of classroom lecture courses is normal but 12 is reasonable during the first year or two in the graduate program, although it may be difficult to perform much research with that amount of lecture, homework and exams. Seminar, thesis hours and dissertation hours do not require homework or exams.

NOTE: The maximum load that will be paid for by the student's assistantship is:

Spring or Fall Semesters: 15 hours
Total for Summer Semester: 8 hours

RESEARCH PROJECTS

During the first semester in residence students should visit with members of faculty to locate a professor and a research area that match their interests. SPAC 5111L is a course designed to provide an overview of some of the various research fields available. Students will meet with the SPAC Admissions Committee at the end of the first semester for the purpose of matching the student with a graduate advisor.

The student and advisor will then form an advisory committee consisting of faculty inside and outside of the Space Center. The specific makeup of the committee is described later in this document, depending on the degree sought. The graduate advisor will work closely with the student to help plan the overall program and coordinate the coursework and research activities. Frequent contact between student and advisor is necessary to accurately define the research project, its goal, extent, and procedures. The graduate advisor will monitor the day-to-day progress of the research project.

No later than the end of the second semester the student, with the advisor's help, should propose the research project to the committee for advice and approval. Because of the unpredictable nature of research, students are encouraged to start their research activities early in their graduate program.

A written thesis or dissertation that provides a detailed documentation of the research activities must be prepared in accordance with Graduate School format and procedures (see below). The document should be comprehensive in covering the current "state of the art" in the research area, the problem definition, the solution or experimental techniques, the results, the explanation of results, the conclusions, and the recommendations.

A comprehensive oral examination covering the content of the thesis or dissertation is administered by the committee. A candidate that fails the examination may resubmit the thesis/dissertation after the corrective action, as determined by the committee, has been completed.

Typically, a master’s thesis should produce one published paper in a peer-reviewed journal, and a doctoral dissertation should yield four such papers. Dissemination of knowledge through attendance at conferences and publication is expected for both masters and doctoral students.

Thesis and Dissertation Preparation

Thesis and dissertation preparation should be done carefully to ensure that the final document meets Graduate School specifications. These specifications are at:

http://grad.uark.edu/dean/thesisguide.php

The thesis or dissertation document should be printed out and checked with the Graduate School to ensure that it is in the correct format. Copies may then be prepared for the Graduate School, Space Center, advisor and student.

DEGREE REQUIREMENTS: PhD

Coursework

The coursework requirements are at least 34 semester hours of courses + at least 18 hours of SPAC 700V for a total of at least 72 hours beyond the baccalaureate as follows:

Non-Core Courses – must take all three (5 hrs)
- SPAC 5111L Space and Planetary Laboratory
- SPAC 5211 Proseminar
- SPAC 5123 Internship

Core Courses – four of the following five (12 hrs)
- SPAC 5033 Planetary Systems
- SPAC 5313 Planetary Atmospheres
- SPAC 5413 Planetary Geology
- SPAC 5553 Astrobiology
- SPAC 5613 Astronautics

Space and Planetary Electives (see list below) – three courses (9 hrs)
- Substitutions can be made with the approval of the committee

Other Electives + Seminar – at least 8 hours
- SPAC 5161 Seminar (must take every semester)

Dissertation – at least 18 hrs
- SPAC 700V

No more than two 4000 level classes can be counted towards the PhD.

PhD Candidacy

The student advances to PhD candidacy when the student has finished all of the following:
- Had their research proposal accepted by their committee
- Passed all four of the five core area courses
- Passed SPAC 5111L Space and Planetary Laboratory
- Passed the candidacy examination

Once the student has completed all four of these items and the student's Committee informs the Graduate Coordinator who will inform the Graduate School that the student has formally advanced to candidature.

PhD Candidacy Examination

The PhD Qualifying Examinations are comprised of two parts: a written essay that integrates the various elements of Space and Planetary Sciences and an oral examination (see page 10).

If the student fails any of these exams on the first try, the faculty may grant permission to take those exams a second time. **Under no circumstances will a student be allowed to take the PhD candidacy examination a third time.**

Getting an MS on the Way to a PhD

It is not necessary to obtain an MS degree in this Space Center on the way to a PhD but occasionally it is desirable. This is a decision to be made by the student and advisor, with the concurrence of the student's committee. If an MS in space and planetary sciences is sought, all requirements for that degree, as described earlier in this document, must be satisfied including a proposal and thesis.

Checklist for the PhD

The following forms and procedures should be followed. Samples of these forms are included in Appendix C and the actual forms can be obtained from the space center office or downloaded from the internet at the Space Center or Graduate School web sites.

- File a *Confirmation of Intent to Enroll*. This form accompanies the offer letter from the Graduate School and should be filed with them prior to entering the PhD program. Give a copy to the space center office.
- Identify a graduate advisor during first semester.
- Arrange for a graduate committee; this should be done early in the second semester. For the PhD degree, this committee consists of at least four members: the advisor, at least two other SPAC representatives, and at least one representative from outside of the space center.
- Fill out two forms: *Doctoral Dissertation Committee, Doctoral Program Advisory Committee*. Give them to the Graduate Program Director for submission to the Graduate School. This should be done early in the second semester.
- With the assistance of the graduate advisor, select the courses for the PhD program.
- Select a dissertation topic and title.
- Present a formal proposal of research to the committee for advice and approval.
- Once the proposal is approved, the space center form, *Approval of Research and Coursework Program* should be filled out and signed by the committee. This form should be handed in to space center office.
- Annually, during the spring semester and before April 15th., the student should schedule their annual committee review. Two forms are required for this meeting: (1) *Approval of Research and Coursework Program* (current version) and (2) Annual Graduate School Academic Review. Both forms should be completed at the meeting and then given to space center office.
- File the *Doctoral Dissertation Title* form, preferably in the second semester, but at least one year prior to the comprehensive examination. Give this to Graduate Program Director.
- Complete the coursework and seminar requirements. Students must present a cumulative grade-point average of 3.0.
- Take the PhD candidacy examination before the end of the fourth semester. This is designed to demonstrate mastery of the core subjects and an ability to integrate the elements of Space and Planetary Sciences. All parts of the examination must be taken during the same semester.
- Apply for graduation in the Graduate School office at the beginning of the last semester and ensure that the student's records are complete and up to date.
- Prepare the dissertation following Graduate School format: (http://grad.uark.edu/dean/PreparingDissertationGuide.pdf)
- Submit the dissertation to the advisory committee at least two weeks prior to the oral exam.

- Give an abstract of the dissertation to the Graduate School at least two weeks before graduation. Go to the Graduate School office to do this.

- Take the oral comprehensive examination, the cardboard form *Record of Progress, PhD Degree* should be completed at this meeting. The entire committee will sign this. Give the completed form to space center office. Have this form ready, along with the three signature sheets for the dissertation, at the meeting.

- Print out the student's final thesis, have the Graduate school check it for format, prepare two copies for the graduate school, one for the advisor, one for the space center, and one for the student.

DEGREE REQUIREMENTS: MASTER'S

Coursework

The coursework requirements are least 24 semester hours of courses + at least 6 hours of SPAC 600V for a total of at least 30 hours beyond the baccalaureate as follows:

Non-Core Courses – must take both (2 hrs)
SPAC 5111L Space and Planetary Laboratory
SPAC 5211 Proseminar

Core Courses – three of the following five (9 hrs)
SPAC 5033 Planetary Systems
SPAC 5313 Planetary Atmospheres
SPAC 5413 Planetary Geology
SPAC 5553 Astrobiology
SPAC 5613 Astronautics

Space and Planetary Electives (see list below) – three courses (9 hrs)
Substitutions can be made with the approval of the committee

Other Electives + Seminar – at least 4 hours
SPAC 5161 Seminar (must take every semester)

Thesis – at least 6 hrs
SPAC 600V

No more than two 4000 level classes can be counted towards the MS.

MS Candidacy

12 semester hours of graduate credit as per Graduate School requirements.

Checklist for the MS

Master's students should be able to finish their coursework requirement in three semesters (including the summer) by taking 9, 9 and 6 hours of classroom lecture courses along with the associated Seminar and Master's Thesis hours. This leaves time at the end of the residency for research. The following forms and procedures should be followed. Samples of these forms are included in Appendix B and the actual forms can be found on the Graduate School web site.

- File a *Confirmation of Intent to Enroll*. This form accompanies the offer letter from the Graduate School and should be filed with them prior to entering the MS program. Give a copy to the space center office.
- Identify a graduate advisor during first semester.
- Identify a graduate advisory committee; this should be done early in the second semester. For the master's degree, this committee consists of at least three members: the advisor, at least one other SPAC representative, and at least one representative from outside of the space center.
- Fill out two forms: *Master's Thesis Committee, Master's Program Advisory Committee*. Give them to space center office for submission to the Graduate School. This should be done early in the second semester.
- With the assistance of a graduate advisor, select the courses for the MS program.
- Identify a thesis topic and title.
- Present a formal proposal for research and coursework to the committee for approval and suggestions.

- Once a proposal is approved, the space center form, *Approval of Research and Coursework Program* should be filled out and signed by the committee. This form should be handed in to space center office.
- Annually, during the spring semester and before April 15th., the student should schedule their annual committee review. Two forms are required for this meeting: (1) *Approval of Research and Coursework Program* (current version) and (2) Annual Graduate School Academic Review. Both forms should be completed at the meeting and then given to space center office.
- File the *Master's Thesis Title* form, preferably in the second semester, but at least one year prior to the comprehensive examination. Give this to space center office.
- Complete the coursework (general, core and elective), and thesis requirements. The student must present a cumulative grade-point average of 3.0.
- Apply for graduation in the Graduate School office at the beginning of the last semester. Go to the Graduate School office to do this. Ask them at this time “what else do I need to do to graduate” just to make sure no steps are missed with the Graduate School.
- Prepare the thesis following the Graduate School format: (http://grad.uark.edu/dean/PreparingThesisGuide.pdf)
- Submit the thesis to the advisory committee at least two weeks prior to the oral exam and two weeks prior to graduation.
- Give an abstract of the thesis and an announcement of the date of the final oral examination to the Graduate School at least 10 days before the exam. Go to the Graduate School office to do this.
- Take the oral comprehensive examination; the cardboard form *Record of Progress, Master’s Degree* should be completed at this meeting. The entire committee will sign this. Give the completed form to space center office. Have this form ready, along with the three signature sheets for the thesis, at the meeting.
- Print out the student’s final thesis, have the Graduate School check it for format, and hand in one copy on any kind of paper to the space center.

Appendix A

SPAC Graduate Courses

Graduate Course offerings are divided into General Courses and Core Area Required Courses and Elective Courses. Core courses are taught on a fixed schedule, while elective courses are taught on a more flexible basis.

General Courses

SPAC 5111L Space and Planetary Sciences Laboratory
SPAC 5211 Proseminar
SPAC 5123 Research Internship
SPAC 5161 Seminars and special talks
SPAC 600V Masters' Research – Thesis
SPAC 700V PhD Research - Dissertation

Core Area Required Courses

SPAC 5033 Planetary Systems
SPAC 5313 Planetary Atmospheres
SPAC 5413 Planetary Geology
SPAC 5553 Astrobiology*
SPAC 5613 Astronautics

Core Area Elective Courses

The following courses are taught on an "as needed" basis. Most of these courses are taught regularly, although course offerings are subject to change. Several are taught only on-demand. At least 9 hours of these are required for either the MS or the PhD.

Planetary Geology
GEOS 5063 Geochemistry
GEOS 4413 Principles of Remote Sensing
GEOS 5563 Tectonics
GEOS 560V Applied Climatology
GEOS 5123 Stratigraphic Principles and Practice

Planetary Astronomy
ASTR 4013 Astrophysics
ASTRO 5013 Astrophysics
GEOL 4433 Geophysics
CHEM 5263 Nuclear Chemistry
CHEM 5273 Cosmochemistry
PHYS 5513 Atomic and Molecular Physics

Planetary Atmospheres
GEOG 4353 Elements of Weather
GEOG 4363 Climatology
GEOG/ENDY 5113 Global Change
ENDY 5063 Paleoclimatology
GEOL/ENDY 5533 Marine Geology

Astrobiology

BIOL 4233 Genomics and Bioinformatics
BIOL 4263 Cell Physiology
CHEM 5813 Biochemistry I
CHEM 5843 Biochemistry II

Astronautics and Orbital Mechanics
CENG 4883 Introduction to Image Processing
CSCE 5043 Artificial Intelligence
ELEG 5683 Image Processing
ELEG 5733 Remote Sensing Systems
ELEG 5753 Satellite Communications and Navigation Systems
MEEG 4233 Electromechanical Systems
MEEG 4433 Aerospace Propulsion
MEEG 5273 Electronic Packaging
MEEG 5513 Gas Dynamics

Appendix B

Forms Required in the Graduate Program in Space and Planetary Sciences

Graduate School Forms*

Master's Committee
Doctoral Committee
Master's Thesis Title
Doctoral Dissertation Title
Annual Graduate Student Academic Review

* Record of progress forms (required for graduation) must be obtained directly from the Graduate School. Other forms that students may need *eg.* Add/Change Request for Major/Program, Out of Career Registration (required for enrollment in 4000 level or lower classes) and MS Transfer of Credit forms are available on the Graduate School web site (http://www.uark.edu/depts/gradinfo/forms/index.html).

Space Center Forms

Approval of Coursework and Research Program (PhD)
Approval of Coursework and Research Program (Masters)
Candidacy Form (PhD)

University of Arkansas
Graduate School

REQUEST TO ADD OR CHANGE
A MAJOR/PROGRAM

Instructions: Use this form **ONLY** if you will **NOT** be completing your current program. By filling out this form, you are indicating your intent to **CHANGE** from one program (major) to another OR to **CHANGE** from one level to another (such as from PhD to master's level) without completing your current program. If you wish to begin or add a new program and you will complete your current program, you must fill out a new application form.

Please check here: ☐ **I will NOT complete my current program. I want to CHANGE to a new one.**

Please note that you must sign this form in order for your request to be processed.

Caution: If you have been awarded a fellowship (Lever, DAF, etc.) or graduate assistant position based on your degree program, changing your degree program may render you ineligible to continue to receive such an award.

Name: ID#: _____

Current address:

_____
Street Address, including apartment number if applicable City State Zip

Gender: □F □M Telephone: _____ Email: _____

Please fill out completely:

Current program: ❑ MS ❑ MA ❑ Doctoral ❑ MFA ❑ Specialist ❑ Certificate Major: _____

New program: ❑ MS ❑ MA ❑ Doctoral ❑ MFA ❑ Specialist ❑ Certificate Major: _____

Effective semester: _____

Students discontinuing a doctoral program must check here:

❑ I understand that all residency in my current program that might have been established is void and will not be applied toward any other graduate degree program. If I reenter this program, I will be required to reestablish residency in the program.

Please note that you must sign this form in order for your request to be processed.

Signature _____ **Date** _____

Please return this completed form to the Graduate School in 119 OZARK

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall
MASTER'S THESIS COMMITTEE

Student's Name: _____ ID Number: _____

Degree Sought: _____ Degree Program: _____

The Master's Thesis Committee is responsible for insuring that the thesis presented meets high academic standards and constitutes a significant contribution to the knowledge of the study area.

Master's Thesis Committee
All committee members must hold graduate faculty status of I or II.
(Please type or print **FULL NAME**. Example: Jane R. Doe.)

_____ **CHAIR***

_____

_____

_____

_____

_____

Chair of the Committee*****: _____ Date:_____
(*signature*)

Department Chair/Head: _____ Date:_____
(*signature*)

Approved: _____Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate as soon as the committee has been selected. The Graduate Dean must approve modifications in the membership of the appointed committee. Committee chairs cannot be removed without their written request.

Original:Graduate School
xc: Department/Degree Program

Revised: 06/12/06

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall

DOCTORAL DISSERTATION COMMITTEE

Student's Name:_____ ID Number:_____

Degree Sought:_____ Degree Program:_____

The Doctoral Dissertation Committee is responsible for insuring that the dissertation contributes new knowledge of fundamental importance or significantly modifies, amplifies, or interprets existing knowledge in a new and important manner.

Doctoral Dissertation Committee
All committee members must hold graduate faculty status of I or II.
(Please type or print FULL NAME. Example: Jane R. Doe.)

_____

_____**CHAIR***

_____

_____

_____

_____

Chair of the Committee*:_____ Date:_____
(* Chair must hold graduate faculty status of I) (*signature*)
Department Chair/Head: _____ Date:_____
(*signature*)

Approved:_____Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate at least one year prior to the defense of the dissertation. The Graduate Dean must approve modifications in the membership of the appointed committee. Committee chairs cannot be removed without their written request.

Original: Graduate School
xc: Department/Degree Program

Revised: 6/12/06

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall

MASTER'S PROGRAM ADVISORY COMMITTEE

Student's Name:_____ ID Number:_____

Degree Sought:_____ Degree Program: _____

The major adviser is appointed immediately after the student is admitted to the program of study. The Master's Program Advisory Committee oversees the student's program of study and is chaired by the major adviser. Frequently, but not invariably, the major adviser also serves as thesis director and the Master's Program Advisory Committee serves as the Master's Thesis Committee.

Master's Program Advisory Committee
All committee members must hold graduate faculty status of I or II.
(Please type or print FULL NAME. Example: Jane R. Doe.)

_____**CHAIR***

_____

_____

_____

_____

_____

Chair of the Committee*:_____ Date:_____
(*signature*)

Department Chair/Head:_____Date:_____
(*signature*)

Approved:_____ Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate as soon as the committee has been selected. The Graduate Dean must approve modifications in the membership of the appointed committee. Committee chairs cannot be removed without their written request.

Original: Graduate School
xc: Department/Degree Program

Revised: 6/12/06

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall

DOCTORAL PROGRAM ADVISORY COMMITTEE

Student's Name:_____ ID Number:_____

Degree Sought:_____ Degree Program: _____

The Doctoral Advisory Committee is appointed immediately the student submits a declaration of intent to study in a doctoral program. It evaluates the student's preparation and fitness for graduate study at the doctoral level. If the student has chosen a major advisor to direct the doctoral research, that professor chairs the Advisory Committee. The Program Advisory Committee develops the student's program of study and monitors progress in it. This group may or may not have the same composition as the Doctoral Dissertation Committee.

Doctoral Program Advisory Committee
All committee members must hold graduate faculty status of I or II.
(Please type or print FULL NAME. Example: Jane R. Doe.)

_____**CHAIR***

_____

_____

_____

_____

_____

Chair of the Committee:_____ Date:_____
(*Chair must hold graduate faculty status of I) (*signature*)

Department Chair/Head:_____Date:_____
(*signature*)

Approved:_____ Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate at least one year prior to the defense of the dissertation. The Graduate Dean must approve modifications in the membership of the appointed committee. Committee chairs cannot be removed without their written request.

Original: Graduate School
xc: Department/Degree Program

Revised: 6/12/06

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall

MASTER'S THESIS TITLE

Student's Name:_____ ID Number:_____

Degree Sought:_____ Degree Program:_____

Title of the thesis to be applied toward the requirements of the degree and the degree program listed above:

_____

_____

_____

Will Research Committee Review Be Required?

(This section **must** be completed.)

			Approval #
Biosafety Committee (Recombinant DNA)	Yes*_____	No_____	_____
Animal Care and Use Committee	Yes*_____	No_____	_____
Institutional Review Board (Human Subjects)	Yes*_____	No_____	_____
Radiation Safety Committee	Yes*_____	No_____	_____

Please refer to the Office of Research and Sponsored Programs web site for information about specific advisory committees: www.uark.edu/admin/rsspinfo/
*NOTE TO STUDENT: If **Yes** is checked, approval must be on file with the Office of Research & Sponsored Programs before the degree will be conferred. If **No** is checked, no data requiring committee approval may be used in the thesis.

Chair of the Committee*:_____ Date:_____
(*signature*)
(*Chair must hold graduate faculty status of I or II.)

Department Chair/Head:_____ Date:_____
(*signature*)

Approved:_____ Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate as soon as the thesis topic has been established. The comprehensive examination may be scheduled as early as three months after the filing and acceptance of the thesis title.

The booklet Guide for Preparing Theses and Dissertations is available on our web site at: http://grad.uark.edu/dean/thesisguide.php as well as at the University of Arkansas Bookstore and should be adhered to rigorously.

Original: Graduate School
xc: Department/Degree Program

Revised: 02/01/06

Graduate School
UNIVERSITY OF ARKANSAS
119 Ozark Hall

DOCTORAL DISSERTATION TITLE

Student's Name:_____ ID Number:_____

Degree Sought:_____ Degree Program:_____

Title of the thesis to be applied toward the requirements of the degree and the degree program listed above:

_____

_____

_____

Will Research Committee Review Be Required?

	(This section **must** be completed.)		**Approval #**
Biosafety Committee (Recombinant DNA)	Yes*_____	No_____	_____
Animal Care and Use Committee	Yes*_____	No_____	_____
Institutional Review Board (Human Subjects)	Yes*_____	No_____	_____
Radiation Safety Committee	Yes*_____	No_____	_____

Please refer to the Office of Research and Sponsored Programs web site for information about specific advisory committees: www.uark.edu/admin/rsspinfo/
*NOTE TO STUDENT: If **Yes** is checked, approval must be on file with the Office of Research & Sponsored Programs before the degree will be conferred. If **No** is checked, no data requiring committee approval may be used in the thesis.

Chair of the Committee*:_____ Date:_____
(*signature*)
(*Chair must hold graduate faculty status of I)

Department Chair/Head:_____ Date:_____
(*signature*)

Approved:_____ Date:_____
Office of the Graduate Dean

This form is to be submitted to the Graduate School in duplicate at least one year prior to the defense of the dissertation. Title changes may be submitted by memorandum to the Graduate School until immediately before graduation; however changes submitted less than four months before graduation may not appear in the Commencement Program.

The booklet Guide for Preparing Theses and Dissertations is available on our web site at: http://grad.uark.edu/dean/thesisguide.php as well as at the University of Arkansas Bookstore and should be adhered to rigorously.

Original: Graduate School
xc: Department/Degree Program

Revised: 02/01/06

ANNUAL GRADUATE STUDENT ACADEMIC REVIEW

Due date to the Arkansas Center for Space and Planetary Sciences by 15 April

1. Student's Name: _____

2. Student's Univ. Identification Number: _____

3. Student's degree program: Space and Planetary Sciences

4. Semester and year student entered degree program: _____

5. This student (check one):

   _____ is making satisfactory progress toward the degree.

   _____ is not making satisfactory progress toward the degree.
   Please attach a statement describing the requirements for satisfactory progress that are not being met by this student. Explain how satisfactory progress toward the degree can be regained.

   _____ has been dismissed from the program because of unsatisfactory progress toward the degree. Please attach a statement explaining why the student was dismissed.

6. The results of the review were communicated to the student:

   a) by face-to-face interview on _____ (date)

   _____ (signature of student)

   b) by the following procedure because the face-to-face interview was not possible or practical (include dates of notification):_____
   _____

7. This form accurately summarizes the annual graduate student academic review for this student for _____ (Academic Year)

_____ _____
Signature of Research Advisor Name of Research Advisor

_____ _____
Signature of Graduate Coordinator Date

FOR GRADUATE SCHOOL USE ONLY:

Review received (signature of dean):_____

Arkansas Center for Space and Planetary Sciences

APPROVAL OF COURSEWORK AND RESEARCH PROGRAM – MASTERS PROGRAM

Meeting Date: _____

Student Name: _____ **Department of advisor:** _____

Major SPAC Field: [Please circle one]

Astronautics Astrobiology Planetary Geology Planetary Astronomy Planetary Atmospheres

Dissertation Subject: _____

Previous degree received (BA, BS, MS): _____ Major: _____

GPA: _____ School: _____ Date: _____

Graduate Courses completed elsewhere (course name, number, date taken, credit hours, and grade):

_____

_____

SPAC MS REQUIREMENTS	**Date Planned**	**Date Taken**	**Grade**
SPAC General (all required):			
SPAC 5111L SPAC lab			
SPAC 5211 Proseminar			
SPAC 5161 SPAC Seminars			
SPAC 5123 SPAC Internship			
SPAC 600V MS Dissertation			
Core courses (3 out of 5):			
SPAC 5033 Planetary Systems			
SPAC 5313 Planetary Atmospheres			
SPAC 5413 Planetary Geology			
SPAC 5513 Biochemical Evolution			
or SPAC 5553 Astrobiology			
SPAC 5613 Astronautics			
Electives (3 from SPAC program list):			
_____ _____			
_____ _____			
_____ _____			

Candidacy: **Date Completed**

12 coursework hours: _____

MS Advisory Committee (Initial for approval**):**

_____ _____

_____ _____

_____ _____

Arkansas Center for Space and Planetary Sciences

APPROVAL OF COURSEWORK AND RESEARCH PROGRAM – DOCTORAL PROGRAM

Meeting Date: _____

Student Name: _____ **Department of advisor:** _____

Dissertation Subject: _____

Previous degree received (BA, BS, MS): _____ Major: _____

GPA: _____ School: _____ Date: _____

Graduate Courses completed elsewhere (course name, number, date taken, credit hours, grade):

_____

_____

SPAC PhD REQUIREMENTS	**Sem. Planned**	**Sem. Taken**	**Grade**
Non-Core Courses – must take all three (5 hrs)			
SPAC 5111L Space & Planetary Laboratory			
SPAC 5211 Proseminar			
SPAC 5123 Internship			
Core Courses – four of the following five (12 hrs)			
SPAC 5033 Planetary Systems			
SPAC 5313 Planetary Atmospheres			
SPAC 5413 Planetary Geology			
SPAC 5513 Biochemical Evolution			
OR SPAC 5553 Astrobiology			
SPAC 5613 Astronautics			
Space and Planetary Electives – three courses (9 hrs)			
_____ _____			
_____ _____			
_____ _____			
Other Electives + Seminar – at least 8 hrs			
SPAC 5161 Seminar, semesters taken:			
other electives:			

Dissertation – at least 18 hrs

You must have at least 72 hours of coursework, sign up for as many SPAC 700V as needed to get this. Number of hours of SPAC 700V taken so far: _____

PhD Candidacy Essay Title _____

_____

Date Taken _____ **Outcome** _____

PhD Advisory Committee (Initial for approval**):**

_____ _____

_____ _____

_____ _____

DOCTORAL PROGRAM

Candidacy Examination

Date of organizational meeting: _____

Date when paper is due to committee: _____

Expected date of examination: _____

Title of candidacy examination paper

Signatures:
Student _____ Chair _____ Director _____

Initials of Committee members: _____ _____ _____

_____ _____ _____

Actual date of examination _____

Outcome of examination (circle)

Pass	Conditional Pass	Re-sit*
Pass (MS prior to advancing to PhD)	Fail (terminal MS)	Fail

Outcome of examination (explain):

Signatures:
Student _____ Chair _____ Director _____

Initials of Committee members: _____ _____ _____

_____ _____ _____
