

Date Submitted: 08/16/19 11:59 am

Viewing: **SPACPH : Space and Planetary Sciences,  
Doctor of Philosophy**

Last approved: 05/21/19 11:06 am

Last edit: 10/17/19 3:09 pm

Changes proposed by: pkoski

Catalog Pages Using  
this Program

[Space and Planetary Sciences \(SPAC\)](#)

Submitter: **pkoski** ~~kkuleza~~ Phone:  
**5902 57456**

Program Status Active

Academic Level Graduate

Type of proposal Major/Field of Study

Select a reason for this modification

Making Minor Changes to an Existing Degree (e.g. changing 15 or fewer hours, changing admission/graduation requirements, adding/changing Focused Study or Track)

Are you adding a concentration?

No

Are you adding or modifying a track?

No

Are you adding or modifying a focused study?

No

Effective Catalog Year Fall 2020

College/School Code

Graduate School and International Education (GRAD)

### In Workflow

1. GRAD Dean Initial
2. GRAD Dean Initial
3. Director of Program Assessment and Review
4. Registrar Initial
5. Institutional Research
6. GRSD Chair
7. GRAD Dean
8. Global Campus
9. Provost Review
10. University Course and Program Committee
11. Graduate Committee
12. Faculty Senate
13. Provost Final
14. Provost's Office-- Notification of Approval
15. Registrar Final
16. Catalog Editor Final

### Approval Path

1. 08/16/19 12:01 pm  
Pat Koski (pkoski):  
Approved for GRAD Dean Initial
2. 08/16/19 12:02 pm  
Pat Koski (pkoski):  
Approved for GRAD Dean Initial
3. 08/17/19 12:51 pm  
Alice Griffin

## Department Code

Department of Graduate Dean (GRSD)

## Program Code

SPACPH

## Degree

Doctor of Philosophy

## CIP Code

(agriffin): Rollback  
to GRAD Dean Initial  
for Director of  
Program  
Assessment and  
Review

4. 08/18/19 9:04 am  
Pat Koski (pkoski):  
Approved for GRAD  
Dean Initial
5. 08/18/19 9:05 am  
Pat Koski (pkoski):  
Approved for GRAD  
Dean Initial
6. 08/30/19 4:39 pm  
Alice Griffin  
(agriffin): Approved  
for Director of  
Program  
Assessment and  
Review
7. 08/30/19 5:25 pm  
Lisa Kulczak  
(lkulcza): Approved  
for Registrar Initial
8. 09/03/19 8:43 am  
Gary Gunderman  
(ggunderm):  
Approved for  
Institutional  
Research
9. 09/03/19 10:28 am  
Pat Koski (pkoski):  
Approved for GRSD  
Chair
10. 09/03/19 10:29 am  
Pat Koski (pkoski):  
Approved for GRAD  
Dean

11. 09/04/19 4:44 pm  
Suzanne Kenner  
(skenner): Approved  
for Global Campus
12. 09/05/19 8:39 am  
Terry Martin  
(tmartin): Approved  
for Provost Review
13. 09/30/19 5:02 pm  
Alice Griffin  
(agriffin): Approved  
for University  
Course and Program  
Committee
14. 10/17/19 3:09 pm  
Pat Koski (pkoski):  
Approved for  
Graduate  
Committee

### History

1. Jun 10, 2015 by  
Charlie Alison  
(calison)
2. Aug 14, 2015 by Lisa  
Kulczak (lkulcza)
3. May 15, 2017 by Pat  
Koski (pkoski)
4. Nov 7, 2018 by Gina  
Daugherty  
(gdaugher)
5. May 21, 2019 by  
Lisa Kulczak (lkulcza)

40.0203 - Planetary Astronomy and Science.

Program Title

Space and Planetary Sciences, Doctor of Philosophy

Program Delivery

Method

On Campus

Is this program interdisciplinary?

No

Does this proposal impact any courses from another College/School?

No

What are the total hours needed to complete the program? 72

## Program Requirements and Description

### Requirements

**Requirements for the Doctor of Philosophy Degree:** Students are required to take a minimum of 72 hours beyond the baccalaureate degree ~~or 42 to include a minimum 34~~ hours **beyond the master's degree to include a minimum 33 of required course work and 18** hours of **required course work and 18 hours of SPAC 700V**.

Course requirements are given below.

### Non-Core Courses

<a href="#">SPAC 5161</a>	Seminar	<b>8</b>
<a href="#">SPAC 5211</a>	SPAC Proseminar	1
<a href="#">SPAC 5123</a>	Internship	3

### Core Courses

Select four of the following: 12

<a href="#">SPAC 5033</a>	Astrophysics I: Stars and Planetary Systems
<a href="#">SPAC 5313</a>	Planetary Atmospheres
<a href="#">SPAC 5413</a>	Planetary Geology
<a href="#">SPAC 5553</a>	Astrobiology
<a href="#">SPAC 5613</a>	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~~

### Dissertation

<a href="#">SPAC 700V</a>	Doctoral Dissertation	18
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Total Hours 51

### Space and Planetary Electives

Note: Other courses may count as electives with the approval of the student's research adviser and **committee**.  
~~committee-~~

**Planetary Astronomy**

<b>ASTR 5043</b>	Astrophysics II: Galaxies and the Large-Scale Universe	3
<del>CHEM 5263</del>	<del>Nuclear Chemistry</del>	<del>3</del>
<b>ASTR 5073</b>	<b>Cosmology</b>	<b>3</b>
<b>BIOL 5003L</b>	<b>Laboratory in Prokaryote Biology</b>	<b>3</b>
<b>BIOL 5263</b>	<b>Cell Physiology</b>	<b>3</b>
<b>BIOL 5233</b>	<b>Genomics and Bioinformatics</b>	<b>3</b>
<b>BIOL 5353</b>	<b>Ecological Genetics/genomics</b>	<b>3</b>
<b>BIOL 5463</b>	Physiological Ecology	3
<b>CHEM 5253</b>	<b>Spectrochemical Methods of Analysis</b>	<b>3</b>
<b>CHEM 5273</b>	Cosmochemistry	3
<b>CHEM 5513</b>	<b>Biochemical Evolution</b>	<b>3</b>
<b>CHEM 5813</b>	Biochemistry I	3
<b>CHEM 5843</b>	Biochemistry II	3
<b>Astronautics and Orbital Mechanics</b>		
<b>CSCE 5043</b>	Advanced Artificial Intelligence	3
<del>MEEG 4233</del>	<del>Microprocessors in Mechanical Engineering I: Electromechanical Systems</del>	<del>3</del>
<b>ELEG 5243L</b>	<b>Microelectronic Fabrication Techniques and Procedures</b>	<b>3</b>
<b>ELEG 5273</b>	<b>Electronic Packaging</b>	<b>3</b>
<b>ELEG 5553</b>	<b>Switch Mode Power Conversion</b>	<b>3</b>
<b>ELEG 5903</b>	<b>Engineering Technical Writing</b>	<b>3</b>
<b>GEOS 5113</b>	Global Change	3
<b>Origin and Evolution of Life</b>		
<del>BIOL 4233</del>	<del>Genomics and Bioinformatics</del>	<del>3</del>
<del>BIOL 4263</del>	<del>Cell Physiology</del>	<del>3</del>
<del>BIOL 4353</del>	<del>Ecological Genetics/Genomics</del>	<del>3</del>
<b>GEOS 5253</b>	<b>Geomorphology</b>	<b>3</b>
<b>GEOS 5273</b>	<b>Principles of Geochemistry</b>	<b>3</b>
<b>GEOS 5293</b>	<b>Introduction to Global Positioning Systems and Global Navigation Satellite Systems</b>	<b>3</b>
<b>GEOS 5363</b>	Climatology	3
<b>GEOS 5563</b>	<b>Tectonics</b>	<b>3</b>
<b>GEOS 5653</b>	<b>GIS Analysis and Modeling</b>	<b>3</b>
<b>MEEG 5273</b>	Electronic Packaging	3
<b>MEEG 5403</b>	<b>Advanced Thermodynamics</b>	<b>3</b>
<b>MEEG 5423</b>	<b>Statistical Thermodynamics</b>	<b>3</b>
<b>MEEG 5833</b>	Aerospace Propulsion	3
<b>PHYS 5363</b>	<b>Scientific Computation and Numerical Methods</b>	<b>3</b>
<b>PHYS 5513</b>	Atomic and Molecular Physics	3
<b>Planetary Geology</b>		
<b>GEOS 5123</b>	<b>Stratigraphic Principles and Practice</b>	<b>3</b>

<del>GEOS 5423</del>	<del>Remote Sensing of Natural Resources</del>	<del>3</del>
<del>GEOS 560V</del>	<del>Graduate Special Problems</del>	<del>2-6</del>
<del>Planetary Atmospheres</del>		
<del>GEOS 5353</del>	<del>Meteorology</del>	<del>3</del>
<b>PHYS 5653</b>	<b>Subatomic Physics</b>	<b>3</b>
<b>SPAC 5033</b>	<b>Astrophysics I: Stars and Planetary Systems</b>	<b>3</b>
<b>SPAC 5313</b>	<b>Planetary Atmospheres</b>	<b>3</b>
<b>SPAC 5413</b>	<b>Planetary Geology</b>	<b>3</b>
<b>SPAC 5553</b>	<b>Astrobiology</b>	<b>3</b>
<b>SPAC 5613</b>	<b>Astronautics</b>	<b>3</b>

~~No more than two 4000-level courses may be counted toward the Ph.D. degree.~~ **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~~ **student's** committee and is designed to test the ~~student's~~ **student's** ability to assimilate, integrate and interpret material learned in the core required **courses 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.** ~~courses: 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.

<del>SPAC/ASTR 5033</del>	<del>Astrophysics I: Stars and Planetary Systems</del>	<del>3</del>
<del>SPAC/GEOS 5313</del>	<del>Planetary Atmospheres</del>	<del>3</del>
<del>SPAC 5413</del>	<del>Planetary Geology</del>	<del>3</del>
<del>SPAC/CHEM/BIOE 5513</del>	<del>Biochemical Evolution</del>	<del>3</del>
<del>SPAC 5613</del>	<del>Astronautics</del>	<del>3</del>

Students should also be aware of Graduate School requirements with regard to doctoral degrees.

Are Similar Programs available in the area?

No

Estimated Student Demand for Program	NA
Scheduled Program Review Date	<b>2025-2026</b> <del>NA</del>

## Program Goals and Objectives

### Program Goals and Objectives

1. To prepare graduates to successfully pursue careers in space and planetary sciences in academia, government and industry.
2. To prepare graduates to approach problems in space and planetary sciences from an interdisciplinary perspective.
3. To produce graduates who will become leaders in space and planetary sciences. ~~NA~~

## Learning Outcomes

### Learning Outcomes

1. Assimilate literature, refereed and unrefereed, to understand the state of previous work in a given area.
2. Design experiments to prove or disprove hypotheses.
3. To build and operate experimental equipment to be used in that assessment.
4. Understand the information that can be gained from common analytical equipment and instruments.
5. Defend the analysis of obtained data in a logical, detached manner.
6. Understand how an understanding of the universe and the exploration of space benefits society and use skills obtained from the program to promote this interaction. ~~NA~~

## Description and justification of the request

Description of specific change	Justification for this change
<p>A program change was made previously without changing the total hours required. This change cleans that up.</p> <p>We also now provide a list of potential electives.</p> <p>We also cleaned up some catalog language.</p>	<p>Catalog accuracy; requirements easier for students to understand. Changes in program administration required changes in catalog language.</p>

## Upload attachments

## Reviewer Comments

**Alice Griffin (agriffin) (08/17/19 12:51 pm):** Rollback: Rolling back at request of submitter.

**Alice Griffin (agriffin) (08/19/19 9:18 am):** Inserted Program Goals and Student Learning Outcomes, plus the scheduled program review date.

**Alice Griffin (agriffin) (08/30/19 4:39 pm):** Deleted comment "Other Electives" and moved SPAC 5161 up to Core Courses with permission from submitter.

**Lisa Kulczak (lkulcza) (08/30/19 5:24 pm):** Adjusted submitter info for this proposal