# EAPS

## Earth, Atmospheric, and Planetary Sciences

### PURDUE UNIVERSITY

# GRADUATE PROGRAM REGULATIONS: GEODATA SCIENCE FOR PROFESSIONAL MASTER'S CONCENTRATION

# Fall 2020

## I. Introduction and General Policies

The Earth, Atmospheric, and Planetary Sciences (EAPS) Department offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees in atmospheric science, planetary science, and solid-earth geosciences, as well as the Master of Science Concentration in Geodata Science for Professionals (GDSP). A majority of the research conducted within EAPS can be categorized by four research foci: Atmosphere Surface Interactions; Clouds, Climate & Extreme Weather; Geology and Geophysics; and Planetary Sciences. A description of each of these areas can be found on the EAPS website. The GDSP leverages on the inherent interdisciplinary nature of the EAPS programs and Purdue's campus-wide integrative data-science initiatives to develop a highly competitive workforce that can harness the weather, climate, geophysical, and environmental "Big Data" for decision-support in the private industry. GDSP differs from EAPS' existing thesis-only MS degree through its specialized area of data analytics and computational focus, a Master's project report, an industrial internship or an applied research experience, and learning outcomes dynamically tailored to industrial partners' feedback. Its target audience is characterized by interests in acquiring practical skills and knowledge for need-driven solutions in industry.

General regulations and requirements established by the Purdue University Graduate School and published Graduate School *Policies and Procedures Manual for Administering Graduate Student Programs* apply to all graduate students in GDSP.

This document is a statement of internal regulations and policies applicable to GDSP offered by the Department. The regulations and policies are intended to ensure a high level of performance by all individuals granted the terminal Master of Science degree, thus maintaining the overall quality of the EAPS programs. The GDSP Advisory Committee, who works alongside with the EAPS Graduate Committee, is the taskforce that implements the regulations and policies.

## II. Progress Toward Completion of Degree

1. The Graduate Secretary will provide a copy of the semester checklist to each student in their Graduate Handbook. The checklist is a list of goals and regulations each student will be expected to achieve. This checklist is useful for students to gauge their progress toward completion of their degree in a timely manner. It is the student's responsibility to see that each of the goals is met by the end of the semester in which they are listed.

2. Within the first two weeks of the beginning of each fall semester, all graduate students will complete an Individual Development Plan (IDP) to help maintain open lines of communication with their advisor. Except for the last page, the IDP should be treated as confidential between the student and their advisor. The last page should be completed and turned into the Graduate Secretary and may be reviewed by the graduate committee. The IDP can be found at: https://www.science.purdue.edu/graduate/idp.html

3. The Graduate School requires all graduate students to complete the CITI RCR training module within 60 days of starting a graduate program and every five (5) years thereafter. To access the CITI RCR training already purchased by Purdue—you should not pay for the training—follow the steps below:

   a) Click into: https://about.citiprogram.org/en/series/responsible-conduct-of-research-rcr/
   b) On the upper right corner, click to "Log in."
   c) Choose to "LOG IN THROUGH MY INSTITUTION."
   d) Select "Purdue University" from the list of institutions. You will need to use Boilerkey to log in.
   e) Once logged in, click "Courses" among the top menu items.
   f) In the area of "Institutional Courses", next to "Purdue University", click on "View Courses."
   g) Click to "Add a course."
   h) In "Question 2", choose "Responsible Conduct of Research (RCR) Training – Basic Course – For Faculty, Postdoctoral, and Graduate Students."
   i) Submit.

4. Students not fulfilling each requirement in the semester they are listed, must petition the GDSP Advisory Committee for continuation in the program.

## III. Tuition and Fees

The GDSP is a non-thesis Professional Master's program. Students enrolled in the program cannot receive teaching, research, or other graduate assistantships with fee remissions from

Purdue by university regulation. Instead, students are anticipated to be supported by their employers, governments, endowed scholarships, or themselves the whole time in the program. We try to match our program fees and tuition to the Purdue standard Graduate/Professional tuition published by the Office of the Bursar, which is subject to change. The Office of the Bursar site is:

https://www.purdue.edu/bursar/tuition/index.html

The tuition and fees are different among Indiana resident, nonresident, and international students. The Indiana residency classification guidelines can be found below:

http://www.purdue.edu/registrar/currentStudents/residency/index.html

## IV. Advisor and Advisory Committee

1. At the time of recommendation for admission, the applicant is appointed a temporary advisor or co-advisors from the GDSP Advisory Committee. The advisor works with the incoming student, helping to select courses and apply for internships, providing a general orientation on policies and procedures, and assisting in identifying the student's research and professional skills and interests.

2. In many cases, a student's temporary advisor will become their Major Professor. By the end of the first year, students should have chosen a Major Professor and Advisory Committee. The latter by default is formed by the Major Professor and a subset of faculty on the GDSP Advisory Committee. If it is determined that a student's interests more closely relate to those of another faculty member, however, the student may request that this latter faculty member serve as his/her Major Professor. Student's choosing to change their Major Professor after their first year must have approval by the GDSP Advisory Committee. The Major Advisor could be any tenure-track or tenured faculty on campus of Purdue, who will be listed as a GDSP affiliated faculty if not already being one.

3. Responsibility for maintaining the overall quality of graduate programs rests ultimately with faculty members who agree to serve as Major Professors and members of the Advisory Committee. The University Graduate School requires that each student's progress be reviewed each semester. Thus, each student must meet formally with the Advisory Committee at least once each semester. Should a student consistently fail to perform on a level satisfactory to the Advisory Committee, he/she will be asked to discontinue graduate study at Purdue University.

4. The Major Professor and members of the Advisory Committee are formally designated at the time of submission of the Plan of Study *[see Section V(B)1]*.

## V. The Master of Science Program

The technical areas of a data science program are composed of (1) statistical theory, (2) statistical models, (3) statistical and machine-learning methods, (4) algorithms for statistical and machine-learning methods, as well as optimization, (5) computational systems for data analysis, and (6) real

analyses of data where results are judged by the findings, not just the methodology and systems that were used. In the GDSP program, specifically in the context of geosciences, data science applied with the goal of improving understanding of causal relations in the physical system also promotes better predictions, therefore risk assessments.

## A. General

1. **Pre-requisites.** To be admitted to the program, students must satisfy all current EAPS Graduate Application Requirements. In addition, they are required to show on their transcripts that they have completed coursework equivalent to 3 semesters of calculus up through vector calculus, a class in linear algebra/differential equations, one semester of programming (C, Python, and/or Fortran), and a class in statistical methods. Students slightly short of pre-requisites can make up for no more than 3 credits in the first year.

2. It is expected that most GDSP Master's students will complete the requirements for the degree in one and one-half calendar years.

3. The maximum allowable time for completion of requirements for the Master's degree is four (4) years. Students who do not finish within four years must file a written request with the GDSP Advisory Committee to be allowed to continue in the graduate program.

4. At least one-half of the total credit hours used to satisfy degree requirements must be earned in residence on the Purdue campus where the degree is to be granted. At least 31 total credit hours are required.

5. Maximum credit loads (academic course credit and research credit) are established by the University Graduate School. Graduate registration should reflect the student's academic activity as accurately as possible. In fulfilling degree requirements, a normal, full-time load for a graduate student is a minimum of 8 (9 for international students) to a maximum of 18 credit hours per fall or spring semester (minimum of 6 to a maximum of 9 credits during the summer).

6. A student in a Master's program is expected to maintain a minimum cumulative GPA of 3.0/4.0. Failure to do so will result in the student being identified as "LOW" in academic standing by the University Graduate School. Students so identified will not be awarded a degree. A student remaining in "LOW" academic standing for three (3) consecutive semesters will be notified by the EAPS Graduate Committee to terminate their program.

7. All GDSP Master's students are encouraged to participate in EAPS 591 GDS seminar series held every Fall or Spring semester. They are required to register for one (1) semester. It is required that each registered Master's student will present a GDS seminar, based on his/her internship work or applied research, to the faculty, graduate students and other interested individuals (see V.B.2).

8. Research *in absentia* is not allowed.

9. For the semester in which the degree is to be awarded, domestic students must be registered for a minimum of one (1) hour of course credit. International students must be registered

for a minimum of nine (9) hours of course credit unless excused by the University Graduate School and the International Students and Scholar's office.

B. Specific Requirements

1. *Plan of Study*:  Completion of an approved plan of study is required.

   a) An appropriate plan of study will be drawn up by mutual agreement between the student, their Major Professor, and the Advisory Committee.

   b) The plan will reflect a data science application area.

   c) The plan must be prepared by the student and submitted for approval prior to the end of the second (2nd) semester in residence.  The approval procedure will be as prescribed by the University Graduate School.  Access to the electronic Plan of Study Generator (POSG) is via myPurdue.

   d) An approved plan of study admits the student to candidacy for the Master of Science degree, and allows him/her to take the written examination.  To complete an approved plan of study a candidate must complete each course used for fulfilling credit requirements with a letter grade of B or better, and have an overall GPA of 3.0/4.0, or better.

   e) The minimum total number of course credits for the MS degree is 31.  The courses should be selected among the course list approved by the GDSP Advisory Committee. In order to acquire sufficient trainings in the technical areas of data science while gaining relevant work experience with geoscience data upon the confer of MS degree, GDSP students need to complete a minimum total of 31 credit hours, including 27 credits of coursework, 1 credit of seminar, and 3 credits of internship in industry or an applied research experience.

   f) Students will register in 3 total credits of EAPS 59100 (Advanced Topics in Earth and Atmospheric Sciences) with Form VT (Request to create/add variable title course) to fulfill the internship requirement, completed with a written MS Project Report (see V.B.2). As approved by the Major Professor, the credit hours can be broken, for example, into 1 credit of off-campus internship in one semester and 2 credits of written MS Project Report in the following semester.

2. *MS Project Written and Oral Report*:

   a) The report topic will be determined by mutual agreement between the student and the Major Professor, and approved by the members of the student's Advisory Committee. It can also be determined by the agreement between an Internship Advisor and the Advisory Committee.

   b) Submission of an acceptable written report is mandatory. The written report shall consist of a format consistent with a journal article manuscript in one of

the following journals and using the format described in the style manual for that journal:

> Journal of the Atmospheric Sciences
> Journal of Geophysical Research
> Bulletin of the Geological Society of America

The responsibility for review of the format requirements will be assigned to the student's Major Professor. This individual will have the added responsibility of assuring that the final report meets the stylistic requirements adopted by the department.

c) A PDF of your final written report must be turned into the Advisory Committee to pass an *iThenticate* check and publish as an EAPS Technical Report, unless other arrangement is made with the Internship Advisor.

d) The oral report is expected to be presented at the GDS seminar in the same or following the semester the written report is completed.

e) Prior to presenting at the GDS seminar, the student is responsible for completing Graduate School Form 8: Request for Appointment of Examining Committee *a minimum of two (2) weeks in advance*. Students should access the Exam Form Generator through myPurdue and select the "Graduate School Plan of Study" link under the "Graduate Students" section on the "Academic" tab.

f) The Major Advisor, the Advisory Committee, and sometimes the Internship Advisor will evaluate the student's written and oral parts of the project report and provide grades that determine the candidate's completion of degree requirements.

3. *Candidate Course*:

The Graduate School requires all graduate students planning to graduate to be registered for a candidate course. GDSP students must register for CAND 99100 along with at least a class as 99100 is not a stand-alone course.

## VI.  Other Instructions

A. Change in Classification

1. Students intending to change their status from GDSP to a traditional (thesis-based) MS or PhD (without completing the MS) must reapply within a year since starting the GDSP program. In addition to credits received in GSDP, their original application materials and test scores can thus be transferred for consideration of new admission.

2. Students intending to change their status from thesis-based MS or from PhD to GDSP must have written approval from their Major Advisor, the Graduate Committee, and the GDSP Advisory Committee. The student will prepare a memo, addressed to the Graduate

Committee, requesting a reclassification change and the reason for the request. This memo must also include signature approval by their Major Advisor. The student's approved request and records will then be forwarded to the GDSP Advisory Committee for review in an internal admission process.

B.  Petitions for Exceptions to Regulations

1.  Applicants for admission and students in residence may petition the GDSP Advisory Committee and the Graduate Committee for relief from any regulation or policy established by the EAPS Department.

2.  Petitions must be presented well in advance of deadlines, to allow adequate time for the Committee's consideration.

3.  The Graduate Committees may waive a regulation when deemed in the best interest of the academic process.

C.  Graduate School Late Fee Charges

The Graduate School (West Lafayette campus) requires a $200 late fee for the following graduation-related situations:

1.  Electronic Plan of Study received at the Graduate School in the session that the graduate student intends to receive his/her degree. The Graduate School requires the Plan of Study be submitted prior to the start of a session in which a student graduates. (See departmental regulations above for submittal of a Plan of Study, however).

2.  Declaration of candidacy beyond the deadline date.

    See https://www.purdue.edu/gradschool/about/calendar/deadlines.html for deadline dates.

3.  Listing on the Graduate School's candidacy list for the same degree more than two consecutive sessions.