Interdisciplinary Ph.D. Program in Geoinformatics

Geoinformatics centers on the understanding and use of geospatial information and development of spatially integrated methods to address issues related to physical, biological, environmental, and social processes. Geoinformatics encompasses the fields of Geographic Information Systems, remote sensing, spatial analysis, and visual analytics. The Interdisciplinary Master’s Program in Geoinformatics aims to provide students with education and research opportunities to address both fundamental and applied issues in geospatial information and methodology to understand social, natural, and virtual environments. The benefits of Geoinformatics education and research extend across the geo-science, environmental, biological, social, and behavioral sciences as well as engineering because the spatial dimensions of natural and built environments plus social interactions are of paramount importance for understanding classic questions about the natural world and the human environment.

The interdisciplinary program is designed to ensure every student a strong foundation on the fundamentals of geoinformatics yet to be tailored individually to each student’s needs with respect to their cognate field(s) of interest and career goals. Each student will complete required credit hours from blocks of core courses in geoinformatics and elective courses related to their cognate field(s). The core courses emphasize the fundamentals and advanced knowledge of Geographic Information Systems (GIS), Remote Sensing, Spatial Analysis, and Visual Analytics to develop spatial theories and novel applications through interdisciplinary graduate education in geoinformatics. These courses expand upon a range of information technologies, such as programming, database, and statistics. Therefore, Geoinformatics students need to acquire basic IT skills and exposure by taking at least one IT related courses. Students can choose one or more disciplines currently offered graduate programs at the university as their cognate fields upon approval of their advisors.

The Ph.D. program is for applicants with MA or MS degrees in related fields and with ambitions to develop advanced knowledge and methodology in Geoinformatics. Students commonly specialize in one or more of the following areas: environmental remote sensing, spatial visualization, visual analytics, spatial modeling, geocomputation, spatially integrated social sciences, environmental modeling, spatial cognition, and dynamic and complex systems. The Ph.D. program prepares students for careers in both fundamental and applied Geoinformatics in academia, industry, public services, and private organizations.

Admission Criteria

TOEFL: Minimum 580 on paper, 240 on computer, or 95 on iBT TOEFL

GRE: Scores will be evaluated along with transcripts and letters of references. Students with higher GRE scores will be more competitive for admission and assistantships.

Statement of Research Interest and Career Goals: students sharing common interest with geoinformatics faculty as well as being able to articulate their thoughts on career development will be more competitive for admission and assistantships.

The Program
The doctoral program requires 90 post-baccalaureate credit hours which can include up to 44 hours of previous graduate level course work, approved by the student’s graduate committee. The program will include Geoinformatics core courses, cognate discipline courses, and IT courses, complemented by graduate seminars to assure geospatial, computational, applied, and research competencies in Geoinformatics. The reminder of course work after required courses will include electives and research hours, approved by the student's dissertation committee.

I. Core Geoinformatics courses. At least 12 credit graduate hours from the following areas, selected from lists of courses for each area as approved by the faculty oversight committee and graduate liaison and made available to the students and Graduate College.

- GIS Principles and Applications
- GIS and Spatial Analysis
- GIS and Spatial Programming
- GIS and Spatial Modeling
- Environmental Remote Sensing
- Computational Remote Sensing
- Visual Analytics
- Remote Sensing Hydrology*
- Remote Sensing Applications in Hydrology and GIS*

(* The two remote sensing courses in hydrology have strong emphases on remote sensing methodology and image processing. While the courses center on hydrological issues, the image processing techniques and classification methods are fundamental and broadly taught in most fundamental and applied remote sensing courses. Hence, the two courses are included in the Core Geoinformatics Courses).

- Other GIS or Remote Sensing related courses approved by faculty advisor

II. Cognate field course. At least 12 credit graduate hours from a cognate field, as approved by the student’s graduate committee.

Cognate fields can be any graduate programs at OU, including geography, meteorology, hydrology, botany and microbiology, zoology, ecology, political science, sociology, psychology, anthropology, international area studies, etc.

III. Information Technology courses. At least 12 credit graduate hours from the following areas, selected from lists of courses for each area as approved by the faculty oversight committee and graduate liaison and made available to the students and Graduate College.

For students with prior courses before they entered the program, the student’s thesis or dissertation committee can authorize waivers to the information technology courses if they judge competency of the students in the related information technology areas.

These information technology courses can be taken from any departments on campus, including Geoinformatics. For students with prior courses before they entered the program, the student’s thesis or dissertation committee can authorize waivers to the information technology courses if they judge competency of the students in the related information technology areas.
- Statistics courses: Statistics courses are commonly offered in sociology, zoology, engineering, and many other departments.

- Programming courses: Programming courses are available in Computer Science, Management Information Systems, Meteorology, and some engineering departments.

- Database courses: Database courses are available in Computer Science, Management Information Systems, and Library Information Science. Students with prior courses with databases shall select courses from other categories in Information Technology.

- Computation courses: Computational courses are courses with emphases on modeling. The requirements can be fulfilled by any modeling courses, such as Environmental Modeling, Carbon Cycles, Machine Learning, Game Theory and others that are commonly offered in Botany and Microbiology, Civil Engineering and Environmental Sciences, Industrial Engineering, Economics, and Computer Science.

IV. **Graduate Seminars.** At least 6 credit hours.

Two graduate seminar courses or other courses not offered for undergraduate credit as approved by advisor. The seminar courses will ideally include one core Geoinformatics seminar and one seminar in the identified cognate field.

V. **Seminar in Geoinformatics:** at least 4 graduate credit hours

This seminar consists of colloquia in Geoinformatics or related disciplines on campus, graduate research discussions, thesis updates, or study groups in emerging Geoinformatics topics. Students must enroll twice. Regular attendance, enrolled or not, is expected.

VI. **Research Hours:** at least 12 dissertation hours.

VIII. **Electives:**

Doctoral committee approved electives to complete graduate credit hour requirements for doctoral students.

**Requirements to Dissertation Committee Membership**

The committee membership must meet all membership requirements specified by the graduate college and Interdisciplinary Graduate Programs.

Additional requirements to Interdisciplinary Ph.D. in Geoinformatics:

- By the end of the second semester, all Ph.D. students must submit a pre-proposal for committee approval. The pre-proposal will serve as the basis for a diagnostic exam by the committee to determine if the student is prepared to pursue interdisciplinary doctoral research. The student’s advisor is responsible for the format and administration of the diagnostic exam to identify strengths and weaknesses of the student to successfully complete a Ph.D. program. The advisor will work with the committee to inform the student the committee’s diagnosis.
All dissertation committees must have at least 2 graduate faculty from Geoinformatics, 2 graduate faculty from cognate field, and an outside member and the thesis or dissertation must involve concepts, data, or methods from more than one discipline.