Sustainability (Complex Adaptive Systems Science), PhD

This doctoral program is for students who want to research and develop solutions to sustainability challenges and also gain additional skills, to help serve as a bridge between disciplines. Students learn from leading scientists and scholars in this flexible, interdisciplinary program that focuses on both sustainability and complex adaptive systems.

Program Description

Degree Awarded: PHD Sustainability (Complex Adaptive Systems Science)

Complex adaptive systems science is the study of interactive and dynamic systems that change over time. The complex adaptive systems science concentration under the PhD in sustainability trains the next generation of scientists in advanced concepts and methods needed for approaching diverse phenomena in the social and life sciences. The program is tightly integrated with diverse, ongoing, university-wide research on complex adaptive systems science at Arizona State University and emphasizes the value of a complex adaptive systems science perspective, to give better insight and a more active role in seeking solutions to a broad array of critical issues facing our society today. Students will be fluent in the common language of complexity while also receiving a solid foundation in the domain knowledge of existing academic disciplines.

By broadly embedding an understanding of complex adaptive system-relevant approaches into the practice of normal science, students will gain the ability to transform science. The program promotes the development and testing of more robust theories and sophisticated methods in a wider array of research settings. This is needed to develop a deeper understanding of the nature and dynamics of complex adaptive systems, grounded in concrete examples and applications.
The doctoral program in sustainability with a concentration in complex adaptive systems science is offered for students who have completed a bachelor's or master's degree program. The program prepares students to become scientists and leaders in research and to investigate the urgent sustainability challenges of this century. Graduates will possess:

- an understanding of the need for a transdisciplinary approach to solving sustainability challenges
- the ability to communicate their work to professionals in other disciplines, policymakers and the general public
- the breadth of vision to recognize the interconnectedness of social, economic, environmental and technical systems
- the critical-thinking skills to approach sustainability challenges from a systems perspective
- the skills needed to work effectively in interdisciplinary teams
- the technical skills to formulate and solve problems at the appropriate scale

In addition to the common learning outcomes, students will be able to conduct research on particular sustainability challenges using standard skills, including the capacity to identify problems; formulate and test hypotheses; use statistical, econometric and geographical-information-system techniques to construct and analyze datasets; and build and apply models. They will be prepared to lead others in the analysis and design of the built environment and institutions' policies, regulations and technologies to support sustainable development and lead others in applying these concepts and methods to the development of sustainable strategies for water, land, air and urban management at the local and global levels. Students will understand the concepts and methods of a number of critical disciplines bearing on the sustainability of systems at different spatial and temporal scales.

**At a Glance**

- **College/School:** School of Sustainability
- **Location:** Tempe campus

**Degree Requirements**

84 credit hours, a written comprehensive exam, a prospectus and a dissertation
**Required Core (6 credit hours)**
SOS 510 Perspectives on Sustainability (3)
SOS 520 Research Design and Methods for Sustainability (3)

**Foundational Electives (15 credit hours)**

**Solutions Workshop Electives (6 credit hours)**

**Open Electives (21 credit hours)**

**Concentration (12 credit hours)**
CASS Fundamentals (3)
Mathematics of CASS (3)
Modeling CASS (3)
Application of CASS Approaches (3)

**Research (12 credit hours)**
SOS 792 Research (12)

**Culminating Experience (12 credit hours)**
SOS 799 Dissertation (12)

**Additional Curriculum Information**
For open electives and concentration coursework, students should see the academic unit for the approved course list. Please note that only six credit hours of 400 level coursework can be included on the plan of study.

When approved by the student's supervisory committee and the Graduate College, this program allows 30 credit hours from a previously awarded master's degree to be used for this degree. If students do not have a previously awarded master's degree, the remaining coursework will be made up of appropriate electives.

**Admission Requirements**
Applicants must fulfill the requirements of both the Graduate College and the School of Sustainability.

Applicants are eligible to apply to the program if they have earned a bachelor's or master's degree, in any field, from a regionally accredited institution. The school encourages applicants with diverse educational backgrounds and experiences that are relevant to the school's core objectives.
Applicants must have a minimum of a 3.25 cumulative GPA (scale is 4.00 = "A") in the last 60 hours of a student's first bachelor's degree program, or applicants must have a minimum of a 3.25 cumulative GPA (scale is 4.00 = "A") in an applicable master's degree program.

All applicants must submit:

1. graduate admission application and application fee
2. official transcripts
3. statement of intent
4. GRE scores
5. three letters of recommendation
6. resume or curriculum vitae
7. proof of English proficiency

**Additional Application Information**
An applicant whose native language is not English (regardless of current residency) must provide proof of English proficiency.

The statement of intent should not exceed 600 words and should describe how the applicant's background will contribute to success in the program, describe how completion of the degree will support the applicant's long-term career goals and explain why the applicant is applying to the School of Sustainability and, more specifically, the doctoral program with a complex adaptive systems science concentration. The statement of intent should elaborate on key research questions the applicant wishes to address or problems to solve as part of the plan of study, and it should identify potential faculty advisors.

Letters of recommendation must be from three people who can attest to the applicant's academic and professional achievements. At least one letter should be academic in nature.

**Contact Information**

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Admission Deadlines