

Department of Geosciences Strategic Plan, 2020-2025

EXECUTIVE SUMMARY

The Department of Geosciences is a vibrant growing department on the move to provide an enriched and collaborative learning environment. The Department offers various degree programs in Geology, Geography, and Earth System Science, creating a unique and coherent environment for promoting team-based approaches to explore and solve problems regarding Earth's environment and human societies. Our faculty members have developed a suite of courses and curricula that meet high demand from a diverse student population and many parts of the campus while conducting externally-funded, cutting-edge research with collaborators. A well-balanced emphasis of field studies, laboratory analysis, and technology-enhanced data collection and modeling allows us to better train the next generation of Earth and environmental scientists. The total headcount of Geosciences faculty, graduate student enrollment, core courses enrollment, and acquisition of major research instrumentation have significantly increased since the departmental name change to Geosciences in 2015. With the launch of a new interdisciplinary Earth System Science PhD program in 2018, we continue to build a solid base of intellectual resources and facilities to address some of the most challenging issues confronting our society today in topics including environment, water, energy, natural resources and climate. Our research strengths are organized into four themes: 1) Environmental Geosciences; 2) Solid Earth Processes and Dynamics; 3) Earth and Life Through Time; and 4) Geospatial Sciences. Our plan over the next five years is to continue building our capacity through strategic hiring and investment in educational infrastructure and key research areas (e.g., isotope and trace-element geochemistry, geospatial science, water, climate, and environment). The strategic plan described herein presents our mission and strategies to take advantage of emerging opportunities and challenges. This process allows us to identify strengths, weaknesses, and areas of strategic growths, which are critical to make necessary changes and take initiatives to meet our specific goals.

OUR VISION

To be a leading department in the region for fundamental discoveries and broad societal impact through research, education, and outreach in Geosciences disciplines

OUR MISSION

The mission of the Department of Geosciences is central to the overall mission of Auburn University as a land-grant institution, encompassing fundamental components of instruction, research and service in Geology, Geography, and Earth System Science. Specifically, as aligned with the University FY 2019-2024 Strategic Plan, the department's mission is to (1) maintain the unique identity of the Geosciences Department by producing graduates who are educated to play an important role in the many areas of Geosciences in

response to societal needs (teaching), (2) conduct both basic and applied research based on faculty specialty and the priorities of federal and state funding agencies or industry (research), and (3) foster educational exchange with the University, the Alabama community, and society as a whole (outreach).

The department is dedicated to the wide distribution of modern geologic and geographic principles through its programs in undergraduate instruction. The curricula provide sound preparation in basic and applied aspects of geology, geography, earth system science, and geospatial technologies that include professional training needed for registration and licensure for geologists and geospatial scientists, or continued education at the graduate level. In addition, courses offered through the undergraduate programs enhance the university core curriculum by providing fundamental knowledge of earth processes, natural resources, and sustainability to create an informed citizenry.

The department has small but vibrant undergraduate and graduate programs in Geology, Geography, and Earth System Science that offer students quality teaching and research experiences. Directly linked to the department's educational programs is a nationally recognized, faculty-based program of both basic and applied research, which contributes to advancing knowledge in Geosciences disciplines and addressing contemporary issues. State-of-the-art research discoveries of students and faculty are shared with local, state and regional communities through outreach and service activities. The department is further dedicated to outreach and service activities through technological links to agencies, professional societies, publishing houses, industry, and other educational institutions.

In summary, the department's mission is to advance understanding of Earth's dynamic processes and its resources for the sustainable support of natural systems and human society, which is intricately tied to the overall mission of the University. The Department of Geosciences is committed to furthering geologic and geographic knowledge through rigorous programs in teaching, research, and public service. In so doing, the department provides students with the necessary skills and training to enter the work-force or continue in graduate-level education, and to ultimately contribute to the global society of the 21st century.

INCLUSION AND DIVERSITY STATEMENT

The Department of Geosciences is committed to promoting a diverse, inclusive, and equitable university community where we can learn and thrive without fear of discrimination based on age, race, gender, sexual orientation, gender identity, ethnic background, nationality, economic status, and/or disability. We believe acceptance and inclusion of diverse students and faculty is integral to the success and well-being of our students and to achieving overall academic excellence within our discipline.

STRATEGIC STRENGTHS

Geosciences has established strengths in focus areas of transformative research with high

societal impacts, as well as innovative student-centric educational programs. These include:

- Diverse faculty expertise across 5 focus groups with the ability to grow and expand into key areas for disciplinary or interdisciplinary research and teaching to reach a broad audience about important societal issues
- Increases in research instrumentation over the past several years enable faculty, students, and external stakeholders to apply cutting edge techniques to a broad range of inquiries
- The diversity of research faculty in gender has increased considerably over the past several years, commensurate with an increase in the diversity of scientific questions addressed (e.g., Solid Earth, Climate Change, Hydrogeology, Environmental Science, Geoscience Education, Spatial Geosciences, etc.).
- Geosciences is the only unit in COSAM offering both physical and social science core courses that provide hands-on experience and lab/field tools to foster student engagement and recruitment
- Rich history of faculty involvement in public and K-12 school outreach, active news media presence and coverage on timely topics (e.g., earthquakes, extreme weather events, environmental pollution and health, etc.)

STRATEGIC WEAKNESSES AND CHALLENGES

While our growth provides much needed intellectual resources and research facilities to address issues of vital importance to our society today, it also presents challenges to elevate our department to be one of the premier Geosciences programs in the country. The main challenges include:

- Curricular revisions to update course content, reduce redundancy, and increase focus on developing quantitative, analytical, and critical thinking skills
- Increased enrollment of majors to be in line with other COSAM departments or at peer institutions
- Greater success in leading large research projects to significantly increase departmental funding as demonstrated in other COSAM departments
- Increasing faculty to expand course offerings, particularly for existing courses that are not taught due to the lack of a sufficient faculty or expertise
- Increasing faculty incentives for engaging in outreach/recruiting activities that would boost Geosciences enrollments
- Facilitating more interaction between Geology and Geography in both research and teaching, which is not helped by being located in two different parts of campus
- Enhancing social media presence and activities for the department
- Lack of incentives for faculty or student participation in public lectures, panel discussions, workshops, meetings, and science fairs

STRATEGIC Opportunities

- Develop new courses that capitalize on students’ interest in topics highly relevant to society (e.g., climate, environmental health, human-environmental interaction, data sciences, science communication, etc.). There may be opportunities to develop more technology-based certificates
- A new modern building would consolidate all faculty, students, programs, and research facilities under one roof, which is critically needed to elevate the department to national prominence
- Low student to faculty ratios would facilitate undergraduate research directed by individual faculty along with apprenticeship opportunities
- The research expertise in Geosciences aligns very well with the twelve “Science Priority Questions” outlined in the vision of NSF Earth Sciences 2020-2030
- Teaching large number (6) of university core courses and developing dual enrollment courses with Auburn First would give the department a large reach to students with diverse background and interest
- Deliver class/virtual talks to build relationships with high school teachers, focusing faculty efforts on reaching science teachers to make a bigger impact in integrating Geosciences into high school curriculum
- Enhance general public outreach by offering Geosciences lectures for the wider campus community and build effective department webpage and social media presence

GOALS AND STRATEGIES

To achieve the department’s vision and mission we will focus on the following four major goals by employing actionable strategies, which closely follow the six priority areas identified in 2019-2024 university strategic plan, including education (elevating student experience), research (transformative and high-impact research), high-impact service, professional development of staff, strategic enrollment, and operational excellence.

Goal 1: Elevate Student Learning Outcomes and Experience

Facilitating effective student learning environments and supporting students throughout their academic career is a key priority for the Department of Geosciences. The most visible success was the recipient of the University-wide Departmental Award for Excellent in Education (DAEE) in 2017. Geosciences’ low student to faculty ratio presents opportunities for mentoring Geosciences majors and minors. The emphasis over the next five years will be on undergraduate program reform in improving the quality and efficiency of classroom instruction. Based on the feedback provided from the 2019 Academic Program Review and 2020 faculty retreat, we propose a series of strategic initiatives aimed at better preparing our students for life-long success in various Geosciences careers.

Strategic Priority and Action Items

- Revise curriculum and curriculum maps to establish new student learning outcomes, address gaps, and reduce course redundancy
- Develop new tracks for Geography BA degree program with exciting new options
- Engage undergraduate students outside the classroom by offering field trip experiences, research opportunities (e.g., apprenticeship program), colloquium, and internships
- Encourage and reward faculty to apply for extramural grants that would support undergraduate learning (e.g., AU ImProve, NSF REU Program, IUSE-Geopaths, etc.)
- Improve assessment by broadening faculty assignments in course and thesis evaluation, as well as student participations (via graduation exit surveys)

Performance Indicators – measured by quantitative improvement over 2020-2025

- 20% increase in UG enrollment for the department over the 5 years, with a greater increase in geography.
- 75% UG students participate in undergraduate research, in the undergraduate learning assistant program, or in study abroad opportunities
- 15% UG students participate in an internship
- >90% UG students participate in field related experiences
- 2 new core courses developed, 2 new dual enrollment courses developed

Goal 2: Promote Research Productivity and Improve Diversity in Research Participation

Geosciences places high priority on increasing research productivity and improving diversity in research participation. The generally low research revenue and ICRE funds in Geosciences budgets presents a major challenge to maintaining and expanding three graduate programs and major research facilities and to attracting and retaining new faculty. Our goal is to acquire a modern building with spaces to house all programmatic elements of Geology and Geography and to incorporate future growth. We find considerable opportunity and synergy in parallel measures to improve research productivity and our diversity in research participation. The dramatic advances in Geosciences' intellectual resources and major research instrumentation in the past few years now provide new and enhanced opportunities for elevating our research enterprise and external funding capacities, via interdisciplinary collaborations in our own department or in partner with other disciplines to provide important services to the state and nation.

Strategic Priority and Action Items

- Actively encourage and strengthen interdisciplinary collaborations in our own department
- Facilitate the development of Geosciences-led, multi-PI research proposals
- Encourage early career faculty to submit NSF CAREER proposals
- Expand efforts to recruit faculty and graduate students from underrepresented and disadvantaged groups and engage new departmental stakeholders in conducting cutting-edge research using departmental resources and facilities
- Build long-term research relationships with scientists from diverse backgrounds and reward success with departmental incentives.

Performance Indicators – measured by quantitative improvement over 2020-2025

- The Department of Geosciences will have led, collectively over the next five years, the submissions of at least four large (> \$0.5M), multi-PI proposals submitted for extramural funding
- In addition to the collaborative research proposals, all Geoscience faculty will continue to submit proposals for extramural funding in their own areas of specialty, at a rate of one or more proposals per faculty per year
- At least one junior faculty member in Department of Geosciences will receive NSF CAREER grant support in the coming five years
- The faculty annual review will include provision for awarding the efforts and success of faculty and research personnel to engage students from underrepresented and disadvantaged groups, with an emphasis on funding through the NSF EPSCoR program
- The faculty annual review will include provision for awarding the efforts of faculty and staff to build long-term research relationships with scientists from diverse backgrounds, with an emphasis on funding through the NSF EPSCoR program

Goal 3: Promote Geosciences Teaching Program to Boost Enrollment and Retention

The total graduate student enrollment (40+) has reached the highest level in the history of the department since the implementation of the new Earth System Science PhD program in 2018. By contrast, the total number of Geology and Geography majors has decreased over the past few years, particularly the Geography majors, due to increasing competition from other academic units on campus. There is an urgent need to rebuild and expand our intellectual and instrumental resources in geography and geospatial sciences to strengthen the Geography program and the department as a whole. The department needs to re-evaluate its course/program offerings and recruiting strategy to achieve and maintain a robust and diverse enrollment of students at the undergraduate and graduate levels across.

Strategic Priority and Action Items

- Develop new core courses (e.g., Global System I and II) which would increase the diversity of Geosciences core course offering and expand student enrollment
- Continue our partnership with the Biggio Center to provide learning environments that appeal to students, increase engagement, and improve retention
- Work on a recruitment video designed to run on internal TV screens highlighting department and Geoscience career opportunities
- Develop and distribute recruiting information card that could be passed out at Camp War Eagle and other campus events
- Work with COSAM's IED Office to recruit underrepresented student groups via efforts related to research experiences for undergraduate programs, site (HBCU) visits, college prep events, and conference attendance.
- Increase the numbers/amount of designated scholarships for students from underrepresented groups

Performance Indicators – measured by quantitative improvement over 2020-2025

- 20% increase in UG enrollment for the department over the 5 years, with a greater increase in Geography
- Develop 2 new Geography Core Science Courses by Fall 2021
- Develop a new marketing strategy including brochures, improved webpage, and social media outlets
- Develop faculty incentives that recognize individuals for recruiting students. Individual faculty members should have a goal of recruiting 3 new students per year

Goal 4: Increase Geosciences' Engagement with K-12 Schools and General Public

The relevance of the Geosciences to issues facing the society provides excellent opportunities for outreach. Sharing our professional knowledge via outreach would help develop a scientifically literate citizenry. Many Geosciences faculty have the experience and expertise to engage the greater Alabama community, including diverse populations from underrepresented groups. The stakes are especially high at K-12 schools where we need to build strong partnership in Geosciences education to recruit the next generation of geoscientists. Moreover, the significance of outreach and community service has been emphasized as Broader Impacts by many federal agencies such as NSF. We believe that increased engagement will improve the well-being of society, and that beneficial interactions will enhance our opportunities for funded research and student recruitment.

Strategic Priority and Action Items

- Update and improve departmental website by creating a task force, providing testimonials from alumni, students, and faculty for career information on “what do I do with Geosciences majors?”
- Work with COSAM Office of Communications and Marketing to promote Geosciences programs
- Appoint a social media manager to increase posting frequency and content and assess content and activity trends
- Create an outreach task force; host Geoscience mini-conference and workshops that are open to undergraduates, graduate students, high school science teachers and Freshman/Sophomore about Geosciences careers
- Develop relationships with K-12 teachers and students by traveling to area high schools to give presentations and share information about Geosciences careers.
- Integrate outreach activities with research and create more organized outreach activities funded by STEM proposals
- Faculty create 2-minute videos (suitable for K-12) to showcase research that is relevant to society

Performance Indicators – measured by quantitative improvement over 2020-2025

- 10% annual increase in students encountered throughout outreach events (e.g., hold one

new event targeting K-12 students and teachers and one new community event per year)

- 10% annual increase in outreach grants, scholarships, or awards
- 10% annual increase in social media coverage and number of followers
- >80% of faculty will complete outreach videos by summer 2021