



UMass Amherst's Educational Effectiveness Plan (EEP) provides departments with an ongoing structure for conducting systematic inquiry into the effectiveness of their efforts to support student success. Departments initially developed and submitted their EEP inquiry plans and evidence gathering strategies in spring 2018 and are asked to provide updates on their progress on a regular basis. EEP activity is also incorporated into the University's strategic planning process – with departments including their EEP progress and findings into their 2021 Strategic Planning Refresh. What follows is the department's most current reporting, as synthesized by the Office of Academic Planning and Assessment (OAPA).

Geosciences EEP

Identify the evidence you currently use (beyond GPA) to determine that your undergraduates have achieved the objectives you have for them.

Grades in particular courses, especially GEOLOGY 101, 311, 431, and 494LI OR GEOGRAPHY 314 and 486; student responses in Senior Survey. We have developed an assessment survey following key courses and/or each academic year (first year, sophomore, junior, senior) to evaluate connections between courses and learning objectives.

Please describe the focus of your inquiry and explain why this inquiry is important to your department right now.

Line of Inquiry 2018: In the context of undergraduate learning objectives, there are three key things that our department needs to determine: how to ensure that faculty employ our learning objectives in their courses; how to expand opportunities for students to know these learning objectives; and how to determine if our curriculum is achieving the learning objectives. We are at the cusp of a very large revision of our undergraduate curriculum to reflect the current research directions of our faculty, ongoing revisioning of undergraduate geosciences at the national level, and a refocusing of critical societal needs from the geosciences. This revision began with dividing the Geography BA into six concentrations in 2016; the BS programs are undergoing similar restructuring. At the same time, it has been many years (decades) since there has been a substantive self-assessment of the objectives and outcomes of the UMass Geoscience majors, and growing evidence (anecdotal and from senior survey results) that while our students are happy in their major, they need us to deliver more skills and competencies that can translate into post-graduation employment.

Progress your department has made toward addressing your line of inquiry, and the types of evidence that you have collected to inform your inquiry.

In Geosciences, our EEP line of inquiry comprises three efforts: ensuring that all faculty know and use SLOs in their courses, making students aware of the SLOs in their courses and in their

overall degree programs, and assessing how well our curriculum helps students achieve these SLOs. In this regard we are making strides, but it is still an act-in-progress. Among these are:

- Updates to the MS and PhD handbooks for both the Geosciences and Geography graduate programs, highlighting the overall degree program SLOs for our graduate students.
- Including discussion of graduate program SLOs with our graduate students in early-career seminars run by the graduate program directors
- Workshops and dedicated faculty meetings on syllabus design, course design and assessment design that includes how faculty can better articulate SLOs in their syllabi, communicate these SLOs to students, and use SLOs to inform design of student assessment.
- Expansion of the geology undergraduate SLOs to a multi-page objectives documents that describes curriculum goals divided into content, skills and competencies, with the intention that faculty can draw from this document to craft individual course SLOs and simultaneously better see how individual course SLOs are woven into the overall undergraduate degree program.
- Expansion of the web presence of the SLOs for the undergraduate Geography program, so that current and potential students can better understand the outcomes they can expect from their undergraduate degree.
- Development of an undergraduate Geology program student survey that asks current students to evaluate how well they think their undergraduate program has helped them achieve the degree program SLOs, with an eye towards using these results to better align what we faculty think our curriculum is doing with what our undergraduate majors experience.
- Increased scrutiny and feedback on course syllabi in both existing courses and proposed courses by the department curriculum committees, including greater emphasis on clear articulation of SLOs in course syllabi and design of assessments that align with those SLOs.

What are your department’s next steps regarding your continuing and/or upcoming EEP line of inquiry?

Our department’s next steps are largely to continue in the approaches we’ve outlined while ramping up and expanding those efforts. We will continue to promote SLOs among faculty in the context of both syllabus and assessment design. Semesterly workshops (as have been run twice this year already) will provide faculty an opportunity to learn about and discuss SLOs in their courses and in the overall degree programs. The curriculum committee will continue to offer guidance and feedback on courses, especially at the stage of new course proposals and review of existing courses. Our other focus (assessment of student achievement of SLOs) will also continue through distribution of our in-house surveys, promotion of SLOs in departmental seminars, and hosting of evening events for students. New efforts will include greater emphasis

on career opportunities and career-related skills, and better understanding of how students make connections between their courses and between courses and SLOs.

What are the Student Learning Objectives for your department or program(s)?

Geology, B.S., Geology B.A., Earth Systems B.S.

- Demonstrate proficient conceptual understanding of:
 - Earth's composition,
 - Earth structure and internal dynamics,
 - key events in physical, biological and environmental evolution over geologic time,
 - geochemical processes in the geosphere, hydrosphere and atmosphere,
 - surficial processes that transform landscapes, coastlines and natural water systems, and
 - the climate system.
- Develop proficiency in key geoscience skills including 3D and 4D representations of data; making and using field-based observations; connecting field observations with academic theory; making inferences from real-world and field data; and interrogating the earth using observations and instruments of the discipline.
- Practice problem-solving skills such as applying indirect measurements; working with uncertainty, ambiguity and incomplete information; exploring cause and effect relationships and logical progressions; quantifying precision, accuracy and error estimation; and integrating data and techniques across subdisciplines.
- Gain proficiency in discipline-specific technical skills, analytical thinking, and quantitative analysis of observations, data and outcomes.
- Practice professional and technical communication skills including critique and debate; working in teams; integrating diverse approaches, perspectives and expertise; scientific writing; scientific oral presentation; and graphical representations of observations and data.
- Demonstrating competency in understanding and describing systems-level thinking; process-based thinking; three- and four-dimension thinking; working with uncertainty; and application of models and experiments in the geosciences.
- These goals apply to the three majors: Geology B.S., Geology B.A., and Earth Systems B.S.

Geography, B.A.; Geography, B.S.

- Develop a solid foundation in geographical theory, concepts, and methodology.
- Develop geographic literacy, particularly with regard to spatial patterns and processes involved with worldwide diversity, globalization, and sustainability.
- Understand historically and geographically contingent political, economic, social, cultural, and physical structures, relationships, interactions, and processes.

- Appreciate the diversity and spatial variation of peoples, cultures, ecosystems, and economic and political systems and conditions.
- Understand the historically and geographically complex and dynamic relationships and interactions of people and environment, current environmental issues and policy debates, and key conservation, development, and sustainability concepts and approaches.
- Gain familiarity with key geographic methods and skills such as fieldwork, cartography, remote sensing, GIS, numeracy, and literacy in geography and related social science and humanities fields.
- Develop a background in one or more concentrations, such as environmental geography and sustainability, globalization and international studies, climate and society studies, urban geography, or Geographic Information Science and technologies. And, apply geographical theory, concepts, methods and skills to analysis and problem solving for contemporary issues, planning, and policy-making and for advancing sustainability and social justice.

Environmental Science, B.S. (Shared with Environmental Conservation, and Stockbridge):

- Graduates will have a working knowledge of core scientific disciplines and their application to natural systems and environmental problems.
- Graduates will understand the complex interactions that define ecosystems and will be able to employ a systems approach to analyze how human and ecological systems interact to influence processes in air, on land, and in water.
- Graduates will be able to characterize environmental systems and apply scientific, mathematical, and statistical concepts to field and laboratory data to critically evaluate increasingly complex environmental issues at local, regional and global scales.
- Graduates will be able to apply an interdisciplinary approach to the technical assessment and analysis of global environmental challenges, and understand the socioeconomic issues that must be addressed to develop effective policy options to meet those challenges.
- Graduates will be able to critically evaluate strategies for sustainable management of environmental systems and for the remediation or restoration of degraded environments and human health protection.
- Graduates will be able to communicate a scientific understanding of environmental issues and develop sound arguments in writing and oral/visual presentation on technical and non-technical levels.
- Graduates will have a deeper understanding of the concepts, processes, problems and solutions of their chosen focus area within the program.
- Experiential Goals
- Geosci 494LI Integrative Experience
- Geosci 396, 496 Independent Study
- Geol 499Y/T

- Geograph 486 Integrative Experience
- Geograph 396, 496 Independent Study
- Geography 499 Y/T

Geosciences, M.S.

- Demonstrate acquisition of broad knowledge of geological principles and mastery of knowledge specific to the student's sub-discipline within the geosciences
- Demonstrate expertise in effective scientific and technical communication in both oral and written forms to both scientist and non-scientist audiences
- Demonstrate capacity for critical evaluation of scientific communications in the form of, e.g., review of scientific literature, asking penetrative questions during seminars, critique and review of peers' written or oral communications, etc.
- Develop and execute sound approaches to investigate outstanding geological research questions
- Acquire advanced data analysis skills and apply these towards solving problems
- Demonstrate expertise in advanced technical skills appropriate for obtaining data and solving problems in the student's sub-discipline within the geosciences

Geography, M.S.

- Understand the academic origins and breadth of subfields in geography, and develop a strong foundation in one or more of them.
- Understand the diversity of theoretical and conceptual frameworks in geography, and develop a strong grounding in one or more of them.
- Become familiar with current intellectual questions and debates in geography, and their relevance to contemporary issues.
- Demonstrate expertise in effective professional communication in both oral and written forms for both specialist and non-specialist audiences.
- Develop advanced skills in one or more geographic research and analysis method, and use these in MS level research.
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- Complete a major research project, which reflects the integration of theoretical and conceptual perspectives with geographical research methods.