Annual Departmental Report

2021-2022

Program Information

Program/Department: Environmental and Earth Science/Earth and Geographic Sciences
Department Chair: Elizabeth Gordon
Department Assessment Committee Contact: N/A (no assessment committee)

This document is to be kept in the department and an electronic file is due to the AVP of Institutional Research & Planning by June 1, 2022.

A. Departmental Special Section for AY21-22

Department Lessons Learned and Accomplishments

Our department returned to fully in person instruction for most courses this academic year. As noted in last year's assessment report, we found that most of our students were more successful with in person (vs remote) instruction. That said, one of our introductory courses (GEOG1100, Human Geography) was offered in an online, asynchronous modality in an effort to boost enrollment. When initially listed as an in-person course, only five students enrolled. When switched to online, the course filled to capacity at 30 students. As a department, we will continue to discuss how to achieve a balance between in person instruction to support student success, while also acknowledging student demand for some online options. For the upcoming academic year (AY23), we are offering one lab course each semester in a hybrid modality, and one lab course will be offered ONSYNC. (It was notable that our fall hybrid course, Meteorology, filled to capacity before any other lab course, so there appears to be student demand for this modality as well.)

Regardless of modality, faculty members in the department observed that students continue to face academic and social challenges. We recorded more attendance issues than in prior years, as well as students' inability to complete coursework in a timely manner, if at all. Peer TAs within the classroom, used for some geospatial courses, was noted to be helpful.

Many of our courses were approved for the new gen ed, which began Fall 2021. We added a laboratory session to our introductory Earth Systems Science course (GEOG1000) to support its Scientific Inquiry and Analysis gen ed outcome, and added a math prerequisite to several of our lab courses that are taken by non-majors to align with the vertical structure of the new gen ed (building on the QR foundation outcome). One new topics course was offered - Soils and the Environment - which is designed to fill a gap in our Environmental and Earth Science curriculum. Other accomplishments included modifications to the Public Health Science major so that it is more transfer-friendly.

In an effort to prepare our students for their professional lives after graduation, we continued to offer several opportunities for students to engage in research and internships, and the department completed the career competency/curriculum mapping work funded by the Davis Foundation. We also hosted three alumni talks - two focused on work/internship opportunities and one focused on graduate school. Finally, our first Public Health students graduated in May 2022.

B. Program Learning Outcomes (PLOs) (Educational Objectives)

I. List of PLOs and the timeline for assessment.

PLO #	PLO – Stated in assessable terms	Where are the learning outcomes for this level/program published? (please specify) Include URLs where appropriate	Timing of assessment (annual, semester, bi-annual, etc.)	When was the last assessment of the PLO completed?
1.	Students will communicate scientific information through written, oral, and graphical expression with clarity, logical organization, and use of scientific evidence to support their ideas.	https://www.fitchburgstate.edu/academics/programs/environmental-and-earth-science-babs	Annual	AY21
2.	Students will use the scientific process, including experimental design, analysis and critical evaluation of information, and integration of evidence from relevant sources, in the context of environmental investigations.		Bi-annual	
3.	Students will discuss the structure and composition of Earth's interior, surface, and atmosphere, and explain what it means to consider Earth as a system.		Annual	AY21
4.	Students will apply an interdisciplinary approach to analyze and propose solutions to environmental science problems.		Bi-annual	AY19
5.	Describe the complex interactions between humans and their environment, including geological hazards, air and water pollution, global environmental issues, and use and conservation of Earth's resources.		Bi-annual	AY21

II. PLO Assessment (Please report on the PLOs assessed and/or reviewed this year. Programs should be assessing at least one each year.)

Using the table below, list and briefly describe the **direct method(s)** used to collect information assessing whether students are learning the core sets of knowledge (K), skills (S) and attitudes (A) identified as essential.

PLO # (from above)	**Assessment description (exam, observation, national standardized exam, oral presentation with rubric, etc.)**	**When assessment was administered in student program (internship, 4th year, 1st year, etc.)**	**To which students were assessments administered (all, only a sample, etc.)**	**What is the target set for the PLO? (criteria for success)**	**Reflection on the results: How was the "loop closed"?**
1	Final research paper in Environmental Hydrogeology (F21)	3rd/4th year	all	all students at least proficient (grade of 80% or above)	need to address issues with citing sources properly
1	Final paper in Climatology (Sp22)	3rd/4th year	all	all students at least proficient (3 on 4pt scale)	address deficiencies with scaffolding of assignments
2	Final project in Remote Sensing	3rd/4th year	all	all students at least proficient	
3	Exam question in Climatology	3rd/4th year	all	all students at least proficient (3 on 4pt scale)	integrate additional assessments

You may use this comment box to provide any additional information, if applicable:

For PLO1, there were only 8 students enrolled in Hydrogeology and one student did not turn in a final paper. There were 8 EES students in Climatology and two did not submit papers.
For PLO2, there were only five EES students in the course.
For PLO3, there were eight EES students who took the exam.

Summary of Findings: Briefly summarize the results of the PLO assessments reported in Section II above combined with other relevant evidence gathered and show how these are being reviewed/discussed. How are you "closing the loop"?

Reflection Prompt	**Narrative Response**
Other than GPA, what data/ evidence is used to determine that graduates have achieved the stated outcomes for the degree? (e.g., capstone course, portfolio review, licensure examination)	PLO1 (paper): Final paper for the required Environmental Hydrogeology course taken by 3rd/4th year majors. - 75% of students wrote an abstract adequately summarizing their paper - 75% of students correctly formatted and cited their sources - 75% of students properly captioned figures and tables PLO1: Final paper for Climatology, required for the major - 100% of students wrote an abstract adequately summarizing their paper - 50% of students correctly formatted and cited their sources - 83% of students properly captioned figures and tables - 83% of students demonstrated proficiency in writing style/mechanics PLO2: Final image analysis in Remote Sensing -40% of students were proficient PLO3: Exam question in Climatology -75% of students answered question at the proficient level
Who interprets the evidence? What is the process? (e.g. annually by the curriculum committee)	PLO1 (paper): evaluated by instructor using a rubric PLO2: instructor grades image analysis PLO3: instructor grades exam question

What changes have been made as a result of using the data/evidence? (close the loop)	PLO1: Hydrogeology instructor will introduce the assignment with more detail and examples on how to properly cite sources and caption figures/tables. Climatology instructor will schedule a class session with a librarian to teach students proper search strategies and citations. PLO2: Instructor is reflecting on possible changes to improve proficiency with image analysis PLO3: Instructor will integrate additional assessments to gauge student understanding before exam

C. Assessment Plan for Program/Department

I. Insert the program or department Assessment Plan attached

II. Explain any changes in the assessment plan including new or revised PLOs, new assessments that the program/department plans to implement and new targets or goals set for student success. will be discussed at the beginning of the next academic year

III. If you do not have a plan, would you like help in developing one?

D. Program Review Action Plan or External Accreditation Action Letter/Report

Annual Reflection/Follow-up on Action Plan from last Program Review or external accreditation (only complete the table that is appropriate for your program)

I. Programs that fall under Program Review:

i. Date of most recent Review: Oct 2020

ii. Insert the Action Plan table from your last Program Review and give any progress towards completing the tasks or achieving targets set forth in the plan. See attached

II. Programs with external Accreditation: N/A

i. Professional, specialized, State, or programmatic accreditations currently held by the program/department.

ii. Date of most recent accreditation action by each listed agency.

iii. Date and nature of next review and type of review.

E. Departmental Strategic Initiatives

Accomplished Initiatives AY 21-22 **Add more rows as needed**	**Corresponding Strategic Plan Goal & Strategy** **Goal # followed by Strategy # ex: 1.3**	**Indicate if a Diversity, Equity and Inclusiveness (DEI) Goal**
Community building and revival of student club We hosted five departmental events this year, three involving alumni. Two events had alumni discussing internship and employment opportunities and one had alumni discussing graduate school. We also organized a department hike, and co-sponsored a Fitchburg clean-up event.	**1.2** *Establish a learning environment in which academic and co-curricular programs work in synergy to offer applied learning experiences that prepare students for purposeful personal and professional lives.*	☐
Career mapping, through DEF work Reid Parsons served as our liaison to the Davis Foundation work facilitated by Sean Goodlett and Lindsey Carpenter Connors.	**2.5** *Integrate career services into departments and curriculum, and build more consistent career advising across campus, especially for first-year students and sophomores.*	☐
Professional development and curriculum integration of newly acquired drone Our technician, Ian Murray, became licensed to operate our drone. Dr. Parsons incorporated a drone demo into Remote Sensing.	**4.4** *Provide faculty and staff professional development opportunities and appropriate tools, including technology, to ensure they can be effective in their roles.*	☐
Expand use of OER and further develop social justice components of departmental courses Fourteen of our courses offered in AY22 used OER in their entirety, while two courses were in the process of developing/adopting OER. Social justice continues to be integrated into our courses.	**2.1** *Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are.*	■
Develop pathways/Early college offerings There will be one early college/dual enrollment offered over Summer 2022.	**2.1** *Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are.*	■

Planned Initiatives for AY 22-23 Add more rows as needed	Associated Strategic Plan Goal & Strategy Goal # followed by Strategy # ex: 1.3	Indicate if a Diversity, Equity and Inclusiveness (DEI) Goal
Actualize Career competency work; examine ways to ensure equitable access to high impact practices	**2.5** *Integrate career services into departments and curriculum, and build more consistent career advising across campus, especially for first-year students and sophomores.*	■
Expand opportunities for student research and other high impact practices, including study abroad	**1.2** *Establish a learning environment in which academic and co-curricular programs work in synergy to offer applied learning experiences that prepare students for purposeful personal and professional lives.*	☐
Develop pathways/Early college offerings	**2.1** *Achieve a cultural shift around how we advise, mentor, and teach all students, especially traditionally underrepresented and underserved students, so that we meet them where they are.*	■
		☐

F. Departmental Reflection:

Take this section to reflect on--

1) *Initiatives that you may be considering for 22-23 academic year that you did not already capture above.*

2) *Any other thoughts or information that you would like to share.*

Environmental and Earth Science Curriculum and Assessment

I. Catalog description of major requirements

A BS or BA in Environmental and Earth Science require at least 36 credit hours. Required courses include:

Core requirements (27 credits):

GEOG 1000 - Earth Systems Science 3 cr. Or ENSC 1000 - Introduction to Environmental Science 3 cr.
GEOG 2100 - Geology 3 cr.
GEOG 2400 - Introduction to Geospatial Technologies 3 cr. Or GEOG 3120 - Computer Cartography 3 cr.
GEOG 2500 - Oceanography 3 cr.
GEOG 3110 - Climatology 3 cr.
GEOG 4000 - Geographic Information System 3 cr. Or GEOG4002 GIS II or GEOG 4001 WebGIS
GEOG 4200 - Geomorphology 3 cr.
GEOG 4500 - Remote Sensing of the Environment 3 cr.
GEOG 4600 - Environmental Hydrogeology 3 cr.

An additional three courses chosen from (9 credits):
BIOL 1900 - General Biology II 4 cr. Or BIOL 2100 - Flora of New England 3 cr. Or BIOL 3100 - Conservation Biology 3 cr. or BIOL 3102 - Marine Biology 3 cr.
ENSC 2000 - Field Techniques in Environmental Science I 3 cr.
GEOG 2056 - Climate Change and Human History 3 cr.
GEOG 2200 - Meteorology 3 cr.
GEOG 2800 - Map Use 3 cr.
GEOG 3270 - Common Rocks and Minerals 3 cr.
GEOG 4220 - Structural Geology 3 cr.
GEOG 4700 - Geographic Perspectives on Conservation 3 cr.
GEOG 4900 - Independent Study in Geography 1, 2, 3 cr.
GEOG 4940 - Internship in Geography 3 cr. * or GEOG 4950 - Internship in Geography 6 cr. * or GEOG 4960 - Internship in Geography 12 cr. *
*(max 9 cr of internship to apply toward major)

Required cognate courses (27 cr): (to be taken as part of Liberal Arts and Sciences distribution and free electives):
BIOL 2300 - Ecology 4 cr.
CHEM 1300 - General Chemistry I 4 cr.
CHEM 1400 - General Chemistry II 4 cr.
MATH 1700 - Applied Statistics 3 cr.
MATH 1300 - Precalculus 4 cr. or MATH 2300 - Calculus I 4 cr.
PHYS 2300 - General Physics I 4 cr. or PHYS 2600 - Calculus-Based Physics I 4 cr.
PHYS 2400 - General Physics II 4 cr. or PHYS 2700 - Calculus-Based Physics II 4 cr.

II. Assessment Plan

Students who complete a major in Environmental and Earth Science will demonstrate a scientific understanding of how the Earth operates as a system and how humans interact with their environment. They will be able to distinguish between science and non-science, back up arguments with quantitative evidence, communicate their ideas effectively, and explain the necessity and characteristics of an interdisciplinary approach to solving environmental problems.

Environmental and earth science students will:

- communicate scientific information through written, oral, and graphical expression with clarity, logical organization, and use of scientific evidence to support their ideas.
- use the scientific process, including experimental design, analysis and critical evaluation of information, and integration of evidence from relevant sources, in the context of environmental investigations.
- discuss the structure and composition of Earth's interior, surface, and atmosphere, and explain what it means to consider Earth as a system.
- apply an interdisciplinary approach to analyze and propose solutions to environmental science problems.
- describe the complex interactions between humans and their environment, including geological hazards, air and water pollution, global environmental issues, and use and conservation of Earth's resources.

1. Students will communicate scientific information through written, oral, and graphical expression with clarity, logical organization, and use of scientific evidence to support their ideas.

1.1. Information literacy: locate, evaluate, and use relevant information effectively.
1.2. Written communication
1.3. Oral communication
1.4. Graphical/visual

2. Students will use the scientific process, including experimental design, analysis and critical evaluation of information, and integration of evidence from relevant sources, in the context of environmental investigations.

2.1. Gather, organize, interpret, and report scientific data in the context of environmental and earth science investigations.
2.2. Critically and logically analyze competing ideas, and distinguish between scientific and non-scientific approaches to solving problems.
2.3. Use common software (e.g., Excel) to organize and graphically present data.
2.4. Conduct spatial analysis in a GIS environment
2.5. Analyze an environmental issue using and processing remotely acquired imagery
2.6. Describe ethical principles related to scientific inquiry and use of Earth's resources.

3. Students will discuss the structure and composition of Earth's interior, surface, and atmosphere, and explain what it means to consider Earth as a system.

3.1. Describe the structure and composition of Earth's interior, surface (lithosphere, hydrosphere), and atmosphere
3.2. Identify interactions among lithosphere, atmosphere, hydrosphere, and biosphere
3.3. Illustrate and describe energy transfer and element cycling in the Earth system, such as Earth's energy budget, atmospheric circulation, ocean circulation, and the carbon cycle.
3.4. Discuss constructional forces that have shaped Earth's surface (e.g., plate tectonics), theories and evidence of crustal movements, and the effects of crustal movements on Earth's landscape; erosional-depositional processes that change the earth's surface (e.g., weathering, erosion); and describe processes by which water moves on, above, and beneath Earth's surface
3.5 describe Earth's physical evolution through geologic time

4. Students will apply an interdisciplinary approach to analyze and propose solutions to environmental science problems.

4.1. Integrate principles of earth science, physics, chemistry, and biology to answer geoscience questions.
4.2. Apply mathematical principles to quantitatively interpret geoscience data.

5. Describe the complex interactions between humans and their environment, including geological hazards, air and water pollution, global environmental issues, and use and conservation of Earth's resources.

5.1. Discuss society's dependence on Earth resources, such as mineral, rock resources, soil, and water resources; fossil fuels.

5.2. Explain natural hazards related to earth system processes.

5.3. Evaluate the effect of human activity on Earth's natural processes (e.g., global warming, ozone depletion, air pollution, water pollution).

The curriculum to achieve these objectives is as follows:

To gain content knowledge in the **physical environment**, students will take six courses (18 credits):
GEOG1000 *Earth Systems Science,* **OR** ENVS1000 *Introduction to Environmental Science* (3) OR GEOG2003 *Environmental Geology*
GEOG2100 *Geology* (3)
GEOG2500 *Oceanography* (3)
GEOG3110 *Climatology* (3)
GEOG4200 *Geomorphology* (3)
GEOG4600 *Environmental Hydrogeology*

To develop skills in **environmental spatial analysis**, students will take three courses (9 credits)
GEOG2400 *Introduction to Geospatial Technologies* OR GEOG3120 *Computer Cartography* (3)
GEOG4000 *GIS* (3)
GEOG4500 *Remote Sensing of the Environment* (3)

To understand **environmental interactions and applications** – students choose three courses (9 credits) from the following:
GEOG2200 *Meteorology*
GEOG2056 *Climate Change and Human History*
GEOG4220 *Structural Geology*
GEOG4700 *Geographic Perspectives on Conservation*
GEOG4900 Independent Study in Geo
GEOG4940/50/60 Internship in Geo
BIOL2100 *Flora of New England* OR BIOL3100 *Conservation Biology* OR BIOL3102 *Marine Biology*
ENSC2000 *Field Techniques in Environmental Science*
ENSC4050 *Internship in Environmental Science*

Required cognate courses allow students to integrate knowledge from various fields to address environmental problems:
Physics I and II
General Chemistry I and II
MATH1700
MATH1300 or 2300
BIOL2300 *Ecology*

Courses-->	1000 OR	2003	2100	2400	2500	3110	400X	4200	4500	4600		2055	2200	4220	4700	4900	
SLO	EES	Evn Geo	Geol	Geospatial	Ocean	Climo	GIS	Geomorph	Rem Sens	Hydro		CCHH	Meteorolog	structural	Log Pers	Co Internship	
1. Students will communicate scientific information through written, oral, and graphical expression with clarity, logical organization, and use of scientific evidence to support their ideas.																	
1.1. Information literacy						x						x					
1.2. written communication			x		x	x		x		x		x				x	
1.3. oral communication						x	x	x	x	x					x	x	
1.4. graph/visual				x	x	x	x	x	x	x			x				
2. Students will use the scientific process, including experimental design, analysis and critical evaluation of information, and integration of evidence from relevant sources, in the context of environmental investigations.																	
2.1. Gather, organize, interpret, and report scientific data in the context of environmental and earth science investigations				x	x		x	x	x	x			x			x	
2.2. Critically and logically analyze competing ideas, and distinguish between scientific and non-scientific approaches to solving problems																	
2.3. Use common software (e.g., Excel) to organize and graphically present data					x	x							x				
2.4. Conduct spatial analysis in a GIS environment							x										
2.5. Analyze an environmental issue using and processing remotely acquired imagery									x								
2.6. Describe ethical principles related to scientific inquiry and use of Earth's resources.															x		
3. Students will discuss the structure and composition of Earth's interior, surface, and atmosphere, and explain what it means to consider Earth as a system.																	
3.1. Describe the structure and composition of Earth's interior, surface (lithosphere, hydrosphere), and atmosphere.	x	x	x		x	x		x		x			x				
3.2. Identify interactions among lithosphere, atmosphere, hydrosphere, and biosphere	x	x			x	x							x		x		
3.3. Illustrate and describe energy transfer and element cycling in the Earth system, such as Earth's energy budget, atmospheric circulation, ocean circulation, and the carbon cycle.	x	x			x	x							x				
3.4. Discuss constructional forces that have shaped Earth's surface (e.g., plate tectonics), theories and evidence of crustal movements, and the effects of crustal movements on Earth's landscape; erosional-depositional processes that change the earth's surface (e.g., weathering, erosion); and describe processes by which water moves on, above, and beneath Earth's surface.	x	x	x		x			x		x							
3.5. describe Earth's physical evolution through geologic time						x											varies
4. Students will apply an interdisciplinary approach to analyze and propose solutions to environmental science problems.																	
4.1. Integrate principles of earth science, physics, chemistry, and biology to answer geoscience questions.		x				x		x	x	x					x		
4.2. Apply mathematical principles to quantitatively interpret geoscience data.	x	x	x	x	x	x	x	x	x	x			x		x		
5. Describe the complex interactions between humans and their environment, including geological hazards, air and water pollution, global environmental issues, and use and conservation of Earth's resources.																	
5.1. Discuss society's dependence on Earth resources, such as mineral, rock resources, soil, and water resources; fossil fuels.		x								x					x		
5.2. Explain natural hazards related to earth system processes		x	x							x			x				
5.3. Evaluate the effect of human activity on Earth's natural processes (e.g., global warming, ozone depletion, air pollution, water pollution)	x	x			x	x						x	x		x		

Assessment plan, continued: Curriculum map, aligning outcomes with required and elective courses**.**

Assessment plan, continued: Assessment process

PLO #	PLO	Frequency of assessment	Assessment tool	Process (who performs assessment, analyzes data)
1.	Students will communicate scientific information through written, oral, and graphical expression with clarity, logical organization, and use of scientific evidence to support their ideas.	Annual	Manuscripts Presentations Student-created graphs Student-created maps	Instructor uses rubric to assess
2.	Students will use the scientific process, including experimental design, analysis and critical evaluation of information, and integration of evidence from relevant sources, in the context of environmental investigations.	Every 2-3y	Lab reports	Instructor
3.	Students will discuss the structure and composition of Earth's interior, surface, and atmosphere, and explain what it means to consider Earth as a system.	Annual	Exam question in relevant course	Instructor grades question
4.	Students will apply an interdisciplinary approach to analyze and propose solutions to environmental science problems.	Every 2-3y	Exam question in relevant course; Paper	Instructor grades question/essay
5.	Students will describe the complex interactions between humans and their environment, including geological hazards, air and water pollution, global environmental issues, and use and conservation of Earth's resources.	Every 2-3y	Exam question in relevant course; Position paper	Instructor grades question/essay

Earth and Geographic Sciences Action Plan in Table Format – updated May 2022

Specific area where improvement is needed	Evidence to support the recommended change	Person(s) responsible for implementing the change	Timeline for implementation	Resources needed	Assessment Plan	Progress made AY21	Progress made AY22
Enrollments	Enrollments, while improving, remain below target	All faculty	Begin AY21	May require small but undetermined amount of funding	Increased enrollments	Attended open houses and FFDs.	Attended open houses and FFDs. Collaboration with Nursing and Health Professions advising to recruit PHS students.
Curriculum and assessment	New gen ed and associated assessment; Gaps in major courses; skill development; internship assessment	Geo faculty	AY21 – Overall discussion; gen ed proposals and assessment plan AY22 – add/modify major courses as needed AY22-23 – discuss internship assessment AY24 - evaluate	None	Addition of key courses to curriculum; gen ed designations for intro courses; continued assessment of skills; assessment plan for gen ed outcomes and internships	New gen ed designations for all gen ed lab courses and introductory geospatial courses	New gen ed designations for social geography courses; Applied for AIF to obtain course release for internship/HIP work
Capstone experience	No required capstone	Geo faculty	AY21 – planning AY22 – pilot of course-based capstone; identify earth science internships AY23 - evaluate	Course release to build internships	Addition of capstone experience to curriculum		Applied for AIF to obtain course release for internship/HIP work
Strengthen community	Limited sustained opportunities for student extracurricular engagement	All faculty	AY21 – planning AY22 – at least three events AY23 – monthly events	Not yet identified	Number of planned departmental events; attendance at said events		One hike, one clean-up (with sustainability committee), three alum events (Tristan and Sam job talk; Dorian internship and jobs; Tallie and Caroline, grad school)

Marketing	Enrollments	All faculty	1-2y: develop coherence across programs 3-5y: Departmental newsletter				
Outreach -on campus -to local high schools -to broader community	Enrollments/department recognition	All faculty	1-2y: planning 3-5y: implementation 5-7y: develop advisory board	Small amount of funding may be requested to support outreach efforts	Increased outreach activities, ideally translating into increased enrollments		
Participation in early college program	Increase enrollment in courses, possible recruitment	All faculty	1-2y		More early college students in courses		early college GEOG1000 Summer 22
Transfer friendly curriculum/Articulation agreements	Increase enrollments	Faculty develop 2yr plans; Chair to work with Heather Thomas	1-2y		Establishment of 2 yr plan; increase articulation agreements	changes to PHS major that are more transfer friendly	
Curriculum alignment -Add technology objective -GST sequencing and mapping competencies	Align curriculum with learning outcomes	Geo faculty	1-2y		Technology objective added; GST curriculum map		
Experiential learning -study abroad -capstone -field course -certificates	Expand student opportunities	Geo faculty	1-2y: planning 3-5y: implementation	Funding for 'scouting trips' to expand study abroad (or	Increase offerings of experiential learning		Study abroad planning for AY23; discussion of GIS certificate

				domestically); acquire relevant equipment			
Departmental Collaborations	Increase course enrollments	All faculty	1-2y: ETech 3-5y: Bio/Chem		Expansion of programs, increased enrollments of courses		Geoinformatics; Data science discussions; Digital Media Innovation; GIS-CJ added as a data analysis option for CJ major
Personnel	Additional faculty line in geography needed; technician support	Chair to request; all faculty assist in hiring process	Annual request	Costs associated with faculty hire	New geographer joins the department		Technician responsibilities adjusted to provide support to geospatial needs
Equipment acquisition	Student access to equipment that better prepares them for graduate school and employment; expand opportunities for research	Chair to request; faculty identify equipment needs	1-2y, pending budgetary resources	Costs of equipment acquisition and upkeep	Acquisition of relevant equipment		GPS units for study abroad; equipment for soil sampling