Curricular Affairs Committee of the Faculty Senate

MEMO

To: Faculty Senate
From: Colby Kervick and Stephen Everse, Co-Chairs of the CAC
Date: January 11 2024
Re: Approval of a proposal for a new **Minor in Geosciences** submitted by the Department of Geography and Geosciences in the College of Arts and Sciences

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Using an electronic ballot that closed on January 11th 2024, the CAC unanimously approved a proposal for a new **Minor in Geosciences** submitted by the Department of Geography and Geosciences in the College of Arts and Sciences, specifically: Julia Perdrial, Keith Klepeis, Laura Webb, Nicolas Perdrial, Beverly Wemple, Lesley-Ann L. Dupigny-Giroux, and Shelly A. Rayback. If approved by the Faculty Senate and the Board of Trustees, the start date will be the fall 2024 semester.

Program Description and Rationale

Our well-being on Earth depends on solving the most pressing issues of our time that include degrading air and water quality, climate change, increasing energy demand, threat of natural and human hazards, and the decline of life-sustaining geosystem services. To address these complex, and highly interrelated challenges across time and land scales, modern geosciences investigate the past, understand and measure the present, and make predictions about the future behavior of our planet and other planetary bodies. As an interdisciplinary field of study, geosciences take a systems lens to investigate the interconnectedness of the Earth layers including atmosphere, hydrosphere, biosphere, and geosphere and includes how living things, including humans, interact with the Earth and other planetary systems.

The Minor in Geosciences will combine classroom-based education with practice elements such as hands-on field, lab, and data analyses experiences to offer studies of the coherent body of knowledge in the geosciences.

Philosophical Goals Statement

The goals of the proposed program are to address fundamental and applied geosciences questions regarding Earth's transitions over space and time and related societal challenges . Combining cutting-edge research with high impact educational experiences through an innovative, learning outcome-based curriculum, the proposals provide students with opportunities to discover and develop relevant geosciences knowledge and skills. The program will offer students a broad geosciences foundation with the flexibility for specialized study and practical experiences and will integrate research with education to promote excellence in both. This approach will support students in their pursuit of their professional goals in an ever-evolving job market in alignment with the liberal arts mission of College of Arts and Sciences and the land grant mission of UVM.

The goals of the minor are to:

- build knowledge and skills in the breadth of the discipline that encompasses the interconnectedness of the geosphere, hydrosphere, cryosphere, biosphere and atmosphere in the context of the holistic liberal arts perspective.
- offer hands-on skills in lab, field or data analyses in preparation for an ever-changing job market.
- empower learners of all identities including learners that have been traditionally excluded from STEM fields, including students of color, students with disabilities, and LGBTQ+ students.

B. Program level learning outcomes.

The minor will complement the geosciences program by offering students flexibility to explore the breadth in the discipline and contribute to a well-rounded and diverse education. Further, geosciences contribute a systems lens to STEM education; therefore, systems thinking is a key learning outcome for our students. Further, our students will critically engage with the environmental, social, and economic challenges and the colonial history of geosciences. While typically a goal for the major, based on course selection, the minor offers opportunity to build skills around written and oral communication as well as skills in generating and analyzing data through our practice requirement.

The minor is designed for students seeking to complement their major studies with foundational knowledge and skills in geosciences.

Justification and Evidence for Demand

Since the merger of Geography and Geology in 2022, Department of Geology and Geosciences has received weekly inquiries and requests about geosciences offerings from both prospective students and current students, respectively. During Admitted Student Days in spring 2023, several families signaled strong interest in a geosciences program, despite the fact that we are not currently advertising for geosciences in larger ASD events. To meet the demand of currently matriculated students, they have developed a streamlined process for students to declare an Individually Designed Major and Minor (IDM) in geosciences. Currently, five students are working on the application for the major. However, the number of IDM students does not reflect the true level of interest. Indeed, many students, predominantly first-years, have indicated they want to wait and see if the geosciences program will appear in the catalogue.

The geosciences minor does fill the gap created by the deactivation of the geology minor, but also expands beyond the original mission of the geology program through intentional integration of all layers of the Earth (geosphere, hydrosphere, cryosphere, biosphere, and atmosphere) and other planetary bodies. This includes relevant processes across large time- and land-scales with an Earth systems lens, generation of knowledge, as well as skills to respond to shifts in the behavior of our planet across time and space.

Relationship to Existing Programs

This program is housed in the Department of Geography and Geosciences in the College of Arts and Sciences. No other units are involved in meeting the requirements for this program. The geosciences program has direct relationships with other important programs that investigate different spatial scales of physical and human interactions (e.g., Geography, ENVS), and which focus applied aspects of ecosystem processes at shorter timescales (ENSC). No other minor offers this knowledge and skill base. Because of this, no restrictions exist for other minors as overlap does not exist or will be minimal.

The proponents have provided clear distinctions between the proposed program and existing programs in the same department, college or in other colleges.

<u>Within CAS</u>

Within the University of Vermont's College of Arts and Sciences, the launching of the program supports the goals of a liberal arts education where “students experience the connectedness and accessibility of a small liberal arts college within a high caliber public research institution.” The geosciences program also aligns with the college's mission, i.e. “The College of Arts and Sciences at the University of Vermont welcomes difference, values collaboration, encourages debate, and stands for integrity, service, and academic excellence. We are dedicated to the rigorous pursuit, understanding, and dissemination of knowledge through the process of discovery, the creation of art, and the practice of teaching. We provide an integrated and engaging multidisciplinary experience that generates creativity, critical thought, effective communication, and a practiced commitment to serve the pressing needs of society and the natural world.”

Below is a list of programs in CAS which are related to this proposed Minor in Geosciences.

Geography Minor: this program shares a common root word, geo, and also highlights the application of spatialized thinking in social and natural environments, from local to global scales of analysis. Geography is composed of both physical and human geography, and while physical geography shares some aspects with the geosciences, the geosciences minor includes deep time (i.e., the longer timescales that impact deeper Earth layers) and a connection to the core concepts underlying the investigations of all Earth layers and other planetary bodies.

Geospatial Technology Minor (GST): This is a cross-college minor that includes multiple courses taught by geoscience faculty. This minor includes coursework in GIS, remote sensing, computer programming and data analysis. While there is overlap in the available courses between the GST minor and the proposed geosciences minor, and while the proponents do not think it likely that students would declare both minors, the geosciences minor is constructed very flexibly so as to allow a student to complete the GST minor and a geosciences minor without exceeding the allowable 3 credits of overlap (double dip).

Environmental Studies Minor: This minor is interdisciplinary and emphasizes a systems lens, but at timescales that are adapted to the living world (typically decades). The study of the environment does not typically extend below layers of living things and typically excludes the explicit study of rocks or the Earth and other planetary bodies, but instead focusses on the ecosystem context in shallow Earth layers including vegetation and soil. The geosciences minor is complementary in this context as all Earth's layers and their interconnectedness are considered and contribute knowledge and skills across larger timescales and depths to understand, predict and mitigate shifts in our planet's behavior and other planetary bodies.

Outside of CAS

UVM's land grant mission includes the mandate to empower individuals to advance the economic and social well-being of this nation and of the State of Vermont through discovery of knowledge, innovation, and the education of critical thinkers for leadership roles. In support of this mission the proposed Minor in Geosciences can help educate future leaders in systems thinking across these multiple scales and to be transdisciplinary in their problem-solving capacities. The geosciences program will complement and enhance existing programs at UVM through our emphasis on an Earth systems lens and by incorporating knowledge and skills from sub disciplines that investigate the geosphere, hydrosphere, cryosphere, biosphere and atmosphere. Such systems thinking is necessary to address the most pressing issues of our time (degrading air and water quality, climate change, increasing energy demand, threat of natural and human hazards, and the decline of life-sustaining geosystem and ecosystem services) which is complex and highly interrelated across a wide range of scales and disciplines.

Below is a list of programs outside of CAS which are related to this proposed Minor in Geosciences.

Environmental Sciences: At UVM, environmental sciences do not offer a minor, but ENSC major can (but do not have to) declare a minor. For this case, the geoscience minor course selection would be complementary to ENSC, offering valuable knowledge and skills across larger timescales and depths to understand, predict and mitigate shifts in our planet's behavior and other planetary bodies. However, the proponents do not allow students to declare an ENSC geology concentration and a geosciences minor (see restrictions) at the same time.

Curriculum

The course requirements for the proposal minor were adequately described and presented in a way that clearly links concepts and skills to learning outcomes and curriculum structure (foundation, core, electives) as well as their relationship to the CCC. The minor includes at least 16 credits in a structure that ensures students to receive education in a coherent body of knowledge in geosciences through required foundation courses, practice requirement and elective course selection:

Foundation courses (introductory level, 6-7 credits):

All students will take 2 introductory courses that introduce the breadth of the discipline and provide important context for midlevel courses.

Practice (2000-level an up, minimum 3 credits):

At least 3 credits have to be taken in courses that contain a practice element. Note that courses can satisfy more than one category (for example Earth Materials is listed under "Earth and Planetary Materials", Land-Surface Processes & Interactions, and "Practice Requirement").

Electives (2000-level and up, minimum 6-7 credits):

To complete the required minimum of 16 credits, at least additional credits have to be taken from the electives list at the 2000-level or above.

FOUNDATIONS		
Choose one of the following 3-4		
GEOL 1400	Environmental Geology	
or GEOL 1025	or Topics In: LASP Seminar	
GEOL 1100	Earth through time	
And		
GEOG 1200	Weather, Climate & Landscapes	3
PRACTICE		
Choose 1 of the following:		3
Practice Requirement. GEOG2510, 2520, 3505, 3520		
GEOL2105, 3405, 3515, 3993, 3995, 4105, 4405, 4510, 4525		
ELECTIVES.		
At least 6 additional credits from the following:		6-7
Earth and Planetary Materials. GEOL 2105, 2110, 2605, 3515, 4105, 4110, 4510		
Land-Surface Processes and Interactions. GEOG2205, 2250, 2715, 3230, 3250, 3410		
GEOL2105, 2110, 2405, 2410, 3405, 4405		

Other Considerations

The proposal specifies restrictions on ineligible majors, minors and concentrations.

The proposal presented ample evidence of multiple viable pathways /curriculum design that students with varying interests can complete the B.A. major in 4 years.

The proposal listed all existing courses that will contribute to the proposed B.A. program. There is no anticipated negative effect on enrollment since the geosciences program fills a gap created by the termination of the geology program.

The proposal also listed new course name/numbering changes and the faculty responsible for submitting those changes.

Admission Requirements and Process

Anyone in the College of Arts and Science can declare geosciences as a major. Students from other colleges at UVM may also declare a geosciences major if they are willing to enroll as a dual degree student and complete College of Arts and Sciences requirements. In order to graduate with the geosciences major, students will have to maintain a GPA of 2.0 or better.

Anticipated Enrollment and Impact on Current Programs

It is predicted that there will be about 10 minors in the first year with increasing numbers as the program becomes more widely known through work by the Admissions Office and ASVD, the department and college websites, the course catalogue, and through serendipitous encounters with courses linked to students' need to fulfill Catamount Core requirements.

Advising

The requirements including categories are structured such that the degree audit system will be able to evaluate course selection without needing intervention from an advisor.

Assessment Plan

A clear and thorough plan has been presented. It will be overseen by the director.

Staffing Plan, Resource Requirements, and Budget

The program will have a director who will be responsible for typical tasks such as coordinating meetings, advising, admitted student days, outreach, and program assessment. This position is compensated with a stipend and course release to allow time for administrative responsibilities.

The following faculty in the Department of Geography and Geosciences will be participating:

- Julia Perdrial,
- Keith Klepeis,
- Laura Webb,
- Nicolas Perdrial,
- Beverley Wemple,
- Lesley-Ann L. Dupigny-Giroux, and
- Shelly Rayback.

Confirmation has been made that all necessary resources are available from the previous Geology program and the Geography program. No additional resources will be necessary.

First-year costs of the program will be supported by the department's operating budget and previously approved course fees. Current faculty will teach courses listed in the geoscience's curriculum. Graduate students, supported by faculty grants and the Graduate College, will provide additional support.

Costs for the first five years of the program will be supported by the operating budget, approved course fees, and current faculty and GTA'S.

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Evidence of Support

Evidence of support was provided by the following units:

<u>Programs that are aligned and related:</u>

- Geography – Shelly Addison Rayback <srayback@uvm.edu>
- Geospatial Technology Minor – Gillian Galford <gillian.galford@uvm.edu>
- ENVS – Cheryl Morse <Cheryl.Morse@uvm.edu>
- ENSC – Jennifer Pontius <u>Jennifer.Pontius@uvm.edu</u>

<u>Libraries</u>

- Christie Silkotch <christie.silkotch@uvm.edu>
- Laurie Kutner <laurie.kutner@uvm.edu>

Summary

The proposed B.S in Geosciences will be valuable additions to UVM. The proposed curriculum offers breadth, depth and flexibility while recognizing the interconnectedness of the interactions of the Earth and other planetary systems with living things will be examined through a systems lens. These suit the missions of UVM and the College of Arts and Sciences.