



Office Use Only: PP#

**Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program**

Institution Submitting Proposal	Frostburg State University
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Each action below requires a separate proposal and cover sheet.

- | | |
|---|---|
| <input checked="" type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment Yes Payment R*STARS # Payment 850.00 Date Submitted: 2/8/23
 Submitted: No Type: Check # JB 194392 Amount: Submitted:

Department Proposing Program	Geography and Biology	
Degree Level and Degree Type	Bachelor's of Science	
Title of Proposed Program	Environmental Science	
Total Number of Credits	120	
Suggested Codes	HEGIS: 42001.00	CIP: 30101.0000
Program Modality	<input checked="" type="radio"/> On-campus	<input type="radio"/> Distance Education (fully online)
Program Resources	<input checked="" type="radio"/> Using Existing Resources	<input type="radio"/> Requiring New Resources
Projected Implementation Date	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer	Year: 2023
Provide Link to Most Recent Academic Catalog	URL: https://www.frostburg.edu/academics/academic-catalogs.php#/home	
Preferred Contact for this Proposal	Name: Dr. Richard Russo	
	Title: Department Chair Geography	
	Phone: (301) 687-4053	
	Email: rarusso@frostburg.edu	
President/Chief Executive	Type Name: Dr. Ronald Nowaczyk	
	Signature: <i>Ronald Nowaczyk</i>	Date: 02/15/2023
	Date of Approval/Endorsement by Governing Board: 02/01/2023	

Revised 1/2021

February 15, 2022

Dr. James D. Fielder, Jr.
Secretary of Higher Education
Maryland Higher Education Commission
6 North Liberty Street
Baltimore, MD 21201

Dear Secretary Fielder,

The departments of Biology and Geography at Frostburg State University seek to establish an interdisciplinary Environmental Science (ENSC) major to replace the suspended Environmental Analysis and Planning major. Additional proposals will be submitted to discontinue the Environmental Science concentration within the Biology major and the Environmental Science concentration within the Earth Sciences major.

To summarize the changes that will be submitted to MHEC in multiple proposals:

- discontinue the Environmental Analysis and Planning major that is currently in suspension
- discontinue the Environmental Science Concentration in the Biology major
- discontinue the Environmental Science Concentration within the Earth Science major
- replace these with a new major in Environmental Science

The creation of an Environmental Science major will provide students with an academic degree program that addresses many current societal challenges. This proposal elevates environmental studies and science in our curriculum from their more obscure positions as concentrations in other majors.

Proposal Type:	New Academic Program	RStars: JB194392
Proposal Title:	Environmental Science	
Award Level:	Bachelor of Science Degree	
CIP:	030101	
HEGIS:	042001	

We would appreciate your support for the new Environmental Science program that utilizes existing resources and leverages careful planning across departments to meet the needs of our students and aligns with the *2022 Maryland State Plan for Higher Education*. If you have any questions, please do not hesitate to contact me or our Associate Vice President for External Relations & Fiscal Affairs, Dr. Sara-Beth Bittinger, at sbittinger@frostburg.edu.

Sincerely,



Traki L. Taylor, Ph. D.
Provost and Vice President for Academic Affairs

pc: Dr. Darlene Brannigan Smith, Interim Associate Vice Chancellor for Academic Affairs, USM
Dr. Sara-Beth Bittinger, Associate Vice President for External Relations & Fiscal Affairs, FSU
Dr. Michael Mathias, Dean of the College of Liberal Sciences, FSU

**GUIDELINES FOR PROPOSING
NEW ACADEMIC DEGREE PROGRAMS, NEW STAND-ALONE CERTIFICATE PROGRAMS, AND SUBSTANTIAL
MODIFICATIONS**

A. Centrality to Institutional Mission and Planning Priorities:

1. *Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institutions approved mission.*

The proposed major in Environmental Science re-organizes existing courses into a curriculum that better serves students in developing a multidisciplinary pathway towards degree completion in a critical field of study. The proposed major will replace the suspended Environmental Analysis and Planning major as well as the current Environmental Science concentrations in Biology and Earth Sciences.

The program supports Frostburg's mission because its curriculum directly addresses the institutional focus on regional and statewide economic and workforce development, civic responsibility, sustainability, and preparing graduates to meet the challenges of a complex and changing global society.

2. *Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.*

As a reorganization of pre-existing courses and offerings, this proposed major is already aligned with many of FSU's strategic goals. Specifically, it aligns with the following elements of the FSU Strategic Plan:

- I. Focus learning on both the acquisition and application of knowledge.
 - A. Ensure students acquire the essential knowledge and skills needed to succeed – by providing a multidisciplinary approach that is critical to addressing environmental challenges, with tracks for the future scientist and policymaker.
 - B. Infuse applied learning throughout the FSU curriculum – by continuing the tradition of hands-on laboratory activities and field-based activities that are key opportunities in the application of knowledge using appropriate tools and techniques.
- II. Provide engaging experiences that challenge our students to excel.
 - A. Integrate effective career and professional development into the student experience – by the inclusion of a Professional Pathways course into the core of the program, coupled with increased emphasis on internship placements.
- III. Expand regional outreach and engagement.
 - B. Provide opportunities for student engagement to address community needs in the region – by continuing the use of the region's environmental assets as an “outdoor classroom” for our students and connecting them with local organizations and employers which are addressing local environmental concerns.
- IV. Align university resources - human, fiscal, and physical - with strategic priorities.
 - C. Ensure academic programs meet student and workforce expectations – by preparing graduates to develop preparation for careers in the environmental sector, which includes a range of science and policy-based approaches.

3. *Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in Section L.)*

This program makes use of existing faculty and institutional resources. New courses in the program will be covered by the re-allocation of current teaching responsibilities (e.g., replacing a section of BIOL 149 or GEOG 103 with ENSC 150). The curriculum will be implemented without additional costs.

4. *Provide a description of the institution's commitment to a] ongoing administrative, financial, and technical support of the proposed program, and b] continuation of the program for a period of time sufficient to allow enrolled students to complete the program.*

The university already has an institutional commitment to a curriculum in environmental science and sustainability studies through the permanent faculty lines in content areas in this program.

B. Critical and Compelling Need as Identified in the 2022 State Plan for Higher Education:

1. *Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the state in general based on one or more of the following: a] the need for the advancement and evolution of knowledge; b] societal needs, including expanding educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education, or c] the need to strengthen and expand the capacity of historically black institutions to provide high quality and unique education programs.*

“Sustaining the Environment into the Future” is a key element of the Maryland’s 2019 State Development Plan (*A Better Maryland*). The proposed ENSC program supports the preparation of the next generation of Maryland’s green workforce, which will help the state reach its visions of environmental protection and resource conservation and stewardship that are embedded in the state’s development plan.

Frostburg State University serves a student population that includes many individuals who have been educationally disadvantaged in their preparation for higher education because of racial and/or economic barriers. According to the National Center for Educational Statistics, 46% of FSU’s students are non-white or multiracial and 42% are Pell grant recipients. Additionally, an Environmental Science major at FSU has the potential to expand educational opportunities for disadvantaged students, in a critical field, at the regional and state levels.

2. *Provide evidence that the perceived need is consistent with the 2022 Maryland State Plan for Higher Education (MSP-HE)*

The proposed Environmental Science program aligns with the MSP-HE’s priorities 5 and 6:

- Priority 5 -- *Maintain the commitment to high-quality postsecondary education in Maryland* –Frostburg’s proposed ENSC program builds on existing institutional strengths in the natural and physical sciences. This program can serve as a conduit to the newly approved, joint FSU-UMCES Master’s in Environmental Management (MEM) degree program. The MEM program is designed to close the equity gap in the undergraduate to graduate pipeline for environmental professionals in the state.
- Priority 6 -- *Improve systems that prevent timely completion of an academic program* – The ENSC program permits flexibility in meeting requirements, allowing students to find their most successful pathway through the curriculum towards degree completion. It replaces the Environmental Analysis and Planning degree program that was very prescriptive (19 out of 25 courses were pre-determined), requiring 84-88 credits to complete. The ENSC program is 60-68 credits. Also, this proposal includes an articulation agreement with

Hagerstown Community College’s A.S. in Environmental Studies. Together, this proposed program will help reduce the time to degree and bring more graduates with Environmental Science to the workforce in Western Maryland and the state.

C. Quantifiable Evidence & Documentation of Market Supply & Demand in the Region & State:

1. *Describe potential industry or industries, employment opportunities, and expected level of entry for graduates of the proposed program.*

According to the Bureau of Labor Statistics, the industries that are the greatest employers of environmental scientists and specialists are: State Government; Management, Scientific, and Technical Consulting Services; Local Government; Architectural, Engineering, and Related Services; and Federal Government. Graduates of the ENSC program will be ready for entry-level environmental science or policy positions with these and other employers.

2. *Present data and analysis projecting market demand and the availability in a job market to be served by the new program.*

The Bureau of Labor and Statistics’ (BLS) occupational outlook for “Environmental Scientists and Specialists” does not necessarily capture the entire range of occupations for which a graduate of the ENSC program might be “job-ready,” but it provides a look at the core demand for such graduates at the national level. According to the BLS, the Washington DC metro area has the third highest number of such positions in the country, after the New York and Sacramento metro areas.

Quick Facts: Environmental Scientists and Specialists	
2021 Median Pay ?	\$76,530 per year \$36.79 per hour
Typical Entry-Level Education ?	Bachelor's degree
Work Experience in a Related Occupation ?	None
On-the-job Training ?	None
Number of Jobs, 2020 ?	87,100
Job Outlook, 2020-30 ?	8% (As fast as average)
Employment Change, 2020-30 ?	7,300

<https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm>

3. *Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.*

The BLS estimates an average 9,700 environmental scientist and specialist job openings per year in the decade 2020 to 2030. In addition to the core job market demand for environmental scientists and specialists, graduates of the ENSC program might start out in related occupations. Environmental Science and Protection Technicians often only need an Associate degree, but many such positions also require a bachelor’s degree.

Related Occupations

^ All 10 displayed

- 11-9199.11 [Brownfield Redevelopment Specialists and Site Managers](#)
- 19-2041.01 [Climate Change Policy Analysts](#)
- 19-1031.00 [Conservation Scientists](#)
- 13-1041.01 [Environmental Compliance Inspectors](#)
- 17-3025.00 [Environmental Engineering Technologists and Technicians](#)
- 17-2081.00 [Environmental Engineers](#)
- 19-2041.02 [Environmental Restoration Planners](#)
- 19-4042.00 [Environmental Science and Protection Technicians, Including Health](#)  **Bright Outlook**
- 19-2043.00 [Hydrologists](#)
- 19-2041.03 [Industrial Ecologists](#)

U.S. Department of Labor by the National Center for O*NET Development
<https://www.onetonline.org/link/summary/19-2041.00>

4. *Provide data showing the current and projected supply of prospective graduates.*

In the most recent data available from the National Center for Educational Statistics (AY2018-2019), there were 6,650 Bachelor's degrees awarded in Environmental Studies and 7,000 awarded in Environmental Science. While the NCES does not provide projections for degrees by field, it does project a 3% increase from AY 2016-2017 to AY 2028-2029 in undergraduate degrees conferred.

https://nces.ed.gov/programs/digest/d20/tables/dt20_318.30.asp?current=yes
<https://nces.ed.gov/programs/PES/section-6.asp#3>

D. Reasonableness of Program Duplication

1. *Identify similar programs in the State and/or same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.*

There are Environmental Science/Studies undergraduate degree programs at the following USM institutions: Salisbury University, Towson University, University of Baltimore, University of Maryland Baltimore County, University of Maryland College Park, and University of Maryland Eastern Shore. The Office of the Provost at Towson University sent Frostburg a collegial letter of support in December 2022:

“A new undergraduate program in Environmental Science at Frostburg State is likely to have similarities with the ENVS undergraduate program at TU. Our ENVS colleagues do not object to, or oppose, your program and support having an environmentally focused undergraduate degree in western Maryland. However, they think it is important that when your full proposal is submitted for consideration, it includes a detailed description of TU's existing undergraduate ENVS program.”

To that end, Towson's website describes its Environmental Science and Studies program as one that:

Prepares students to enter a range of environmental careers in which they will make a difference as scientists, policy makers, industry representatives and citizens. Graduates also go on to advanced studies, professional training programs, and positions in business, industry and government. Students in the environmental science and studies major take courses in geography, biology, chemistry, political science, geology, economics, health science and philosophy, taught by faculty from many colleges within the university. Students in this major select the environmental science concentration or the environmental studies concentration.

There are Environmental Science/Studies undergraduate degree programs at the following non-USM institutions in Maryland: Goucher College, Hood College, Johns Hopkins University, McDaniel College, Mount Saint Mary's University, Stevenson University, St. Mary's College, and Washington College.

The proposed ENSC program at Frostburg State University will be the only bachelor's degree in Environmental Science in Western Maryland and the surrounding Appalachian region of Maryland. Thus, the program serves a distinct and non-competitive geographic and ecological region in the state.

2. *Provide justification for the proposed program*

Preparation in the environmental sciences is critical in many professions as well as fundamental to one's role as an informed citizen. The fundamental importance of environmental science is one reason why nearly every higher-education institution offers academic programs and/or coursework in this interdisciplinary field.

The proposed ENSC program at FSU is important as a regional resource for the preparation of environmental professionals in the state of Maryland, specifically the Western Maryland region. Providing an undergraduate environmental studies program anchored in the Appalachian region of Maryland is essential to creating opportunities for environmental adaptation, mitigation, and remediation in this ecologically unique region of the state. This need for a regionally focused, broadly applicable environmental studies program is mirrored by the fact that the University of Maryland Center for Environmental Science has established its research and graduate education programs at the Appalachian Laboratory in Frostburg.

The creation of a major in Environmental Science would provide students with the choice of an academic degree program that addresses many challenges society currently faces. This proposal elevates environmental science in FSU's curriculum from their more obscure positions as concentrations in other majors. Additionally, it replaces the suspended Environmental Analysis and Planning major, which was too prescriptive and dependent on faculty expertise that is no longer housed in the departments of Biology and Geography. The proposed program also meets University System of Maryland goals to increase STEM degrees awarded annually (to 11,000) and meets workforce demands for graduates with environmental knowledge and skills.

E. Relevance to High-demand Programs at Historically Black Institutions

1. *Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs.*

Frostburg State University's fall 2020 student population was 29% Black or African American and 5% multiracial. In the 2020 Census, 32% of Marylanders were Black or African American (alone or in combination). Thus, any program at FSU might have an impact on programs at HBIs in the sense that non-HBIs in Maryland are seeking to recruit students from all demographic groups.

Of Maryland's four HBIs, only the University of Maryland Eastern Shore has a comparable undergraduate program. The geographic distance between FSU and UMES also reduces the likelihood of direct impacts on enrollment. While seeking to diversify the student population in the STEM disciplines at FSU, the proposed ENSC program is not designed to challenge the implementation or maintenance of the program at UMES.

F. Relevance to the Identity of Historically Black Institutions (HBIs)

1. *Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.*

The proposed ENSC program at FSU should have no impact on the identity or unique mission of Maryland's HBIs. Environmental Science and Studies degrees are found at many state and private universities in Maryland.

The program curriculum and likely student enrollment do not undermine the institutional identities or missions of any of Maryland's HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

1. *Describe how the proposed program was established, and also describe the faculty who will oversee the program.*

The Environmental Studies proposal is the product of discussions to streamline environmental programs offerings at FSU and to better address the needs of students and the post-graduation job market. It replaces a suspended Environmental Analysis and Planning program and two Environmental Science concentrations, one in Biology and the other in Earth Sciences. The ENSC program will be jointly managed by a committee of faculty from the departments of Biology and Geography, with the chairs of those two departments responsible for representing the program at the institutional level.

2. *Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and modality of the program.*

Objective

The Environmental Science program aims to produce graduates who, with their knowledge of the natural sciences, will be able to apply analytical, communication, and problem-solving skills to protect ecological and human health in a range of professional and environmental settings.

Learning Outcomes

Upon completion of the Environmental Science major, students should be able to:

- I. Demonstrate a professional level understanding of the Earth's environmental systems, including the functional interaction of the atmosphere, hydrosphere, lithosphere, and biosphere (*Linked to Institutional Learning Goals 1 and 3*)
 - II. Demonstrate knowledge and appreciation of the intrinsic worth of ecological processes and communities (*Linked to Institutional Learning Goals 3 and 4*)
 - III. Demonstrate success in hands-on, inquiry-based laboratory investigations, experimentation and/or field work. (*Linked to Institutional Learning Goals 1, 2, and 3*)
 - IV. Demonstrate effective use of diverse methods in the analysis of textual, laboratory, and/or field data to communicate information about the environment in writing, oral presentations, and/or visual representations (*Linked to Institutional Learning Goal 2*)
 - V. Demonstrate an understanding of effective environmental solutions through a knowledge of environmental policies and informed positions on current local, regional, and global environmental issues (*Linked to Institutional Learning Goal 3 and 4*)
3. *Explain how the institution will a) provide for assessment of student achievement of learning outcomes in the program; b) document student achievement of learning outcomes in the program.*

a] The primary program assessment mechanism will be a capstone portfolio in which the student will outline and compose a series of narrative documents detailing knowledge and skills achieved as an Environmental Science major. In support of this narrative, the student will assemble a portfolio of examples of their coursework in the major. The narratives and supporting examples must demonstrate that the student has achieved proficiency in the five identified learning objectives. At least two coursework examples must be cited as supporting evidence for each objective. The narratives and supporting examples will be evaluated by a committee of three faculty members in the program.

b] Student achievement of learning outcomes will be documented in annual reports to the Office of Assessment and Institutional Research.

4. *Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements.*

See Appendix A

5. *Discuss how general education requirements will be met, if applicable.*

The departments of Biology and Geography request that ENSC 150 (Introduction to Environmental Science) to be a course that satisfies one of the two-course requirement in FSU's "Modes of Inquiry GEP C: The Natural Sciences." Other introductory courses in the program (GEOG 103, BIOL 149, CHEM 201) will also satisfy this requirement as well as one of the two course requirements in GEP E: The FSU Colloquia by these additional courses in the Natural Sciences. MATH 109 and 119 will also satisfy the university's Core Skills in Mathematics requirement.

Other FSU general education requirements can be met through course selection that follows student interests and academic advising.

6. *Identify any specialized accreditation or graduate certification requirements for this program and its students.*

N/A

7. *If contracting with another institution or non-collegiate organization, provide a copy of the written contract.*

N/A

8. *Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management systems, availability of academic support services and financial aid resources, and costs and payment policies.*

Program specific requirements will be listed in the FSU Undergraduate Catalog and first-year/transfer student advisors will have access to up to date 8 semester plans for the program (see Appendix B). The program's website will provide links to these resources as well as program check-sheets for students and their advisors. Course-specific technology skills will be communicated through pre-requisites detailed in the Undergraduate Catalog. The other elements addressed in this item are not unique to the proposed ENSC program and are provided by existing university staff in the administrative offices or by university faculty through course syllabi.

9. *Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and services available.*

The Environmental Science program will receive the same advertising, recruiting, and admissions materials that all other major programs receive from various units at Frostburg State University, via multiple avenues and media platforms.

H. Adequacy of Articulation

1. *If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.*

The proposed ENSC program at FSU is designed to facilitate future articulation agreements with community colleges in Maryland. Specifically, the new ENSC 150 (Introduction to Environmental Science) course consists of three-credits of lecture and one credit laboratory, providing a seamless way for students at many of Maryland's community colleges who offer this course to start completing the core requirements of the ENSC program at their two-year institution. This proposal includes an articulation agreement with the A.S. Environmental Studies program at Hagerstown Community College (Appendix C).

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11)

1. *Provide a brief narrative demonstrating the quality of program faculty. Include a summary list of faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, adjunct) and the course(s) each faculty member will teach in the proposed program.*

The ENSC faculty are accomplished academic professionals with evidence of effective classroom instructional design and performance as well as active scholarship in their fields. Faculty teaching in the program include:

Biology

Name	Appt & Rank	Degree and Field	Course(s)
Dr. Franklin Hughes	Assistant Professor, tenure-track (FT)	DC, Chiropractic	BIOL 149
Dr. Cody Kent	Assistant Professor, tenure-track (FT)	PhD, Ecology and Evolutionary Biology	BIOL 149, 406, 414
Dr. Thomas Lambert	Professor, tenured (FT)	PhD, Forestry	BIOL 423
Dr. Hongqi Li	Professor, tenured (FT)	PhD, Biology	BIOL 161, 313
Dr. Kumudini Munasinghe	Assistant Professor, tenure-track (FT)	PhD, Biology	BIOL 304
Dr. David Puthoff	Professor, tenured (FT)	PhD, Biology	BIOL 149, 403
Dr. Richard Raesly	Professor, tenured (FT)	PhD, Biology	BIOL 160, 417, 420, 422, 425, 426
Dr. William Seddon	Professor, tenured (FT)	PhD, Biology	BIOL 149
Dr. Thomas Serfass	Professor, tenured (FT)	PhD, Wildlife & Fisheries Science	BIOL 230, 450
Dr. Kate Sheehan	Assistant Professor, tenure-track (FT)	PhD, Wildlife & Fisheries Biology	ENSC 150, BIOL 309, 340, 411, 430
Ms. Clara Thiel	Lecturer, non-tenure-track (FT)	MS, Applied Ecology & Conservation Biol.	BIOL 328, 405, 409, 425

Chemistry

Dr. Matthew Crawford	Associate Professor, tenured (FT)	PhD, Chemistry	CHEM 311, 312, 320
Dr. Holly Curie	Associate Professor, tenured (FT)	PhD, Chemistry	CHEM 201, 202
Dr. Katie Gares	Lecturer, non-tenure-track (FT)	PhD, Chemistry	CHEM 201, 311, 312
Dr. Robert Larivee	Professor, tenured (FT)	PhD, Chemistry	CHEM 320, 341
Dr. Fayan Meng	Lecturer, non-tenure-track (FT)	PhD, Chemistry	CHEM 201, 202
Dr. Frederick Senese	Professor, tenured (FT)	PhD, Chemistry	CHEM 201, 420, 460

Geography

Dr. Phillip Allen	Associate Professor, tenured (FT)	PhD, Quaternary Science	GEOG 103, 207, 208, 340, 441, 475, 477, 482, 483
Dr. Tianna Bogart	Associate Professor, tenured (FT)	PhD, Climatology	ENSC 150, 485 GEOG 103, 205, 330, 380, 405, 469
Dr. Thomas Cadenazzi	Assistant Professor, tenure-track (FT)	PhD, Civil Engineering	GEOG 433
Ms. Tracy Edwards	Lecturer, non-tenure-track (FT)	MA, Geography	GEOG 103
Dr. Hai Lan	Assistant Professor, tenure-track (FT)	PhD, Geographical Sciences	GEOG 317, 380, 420
Mr. Adam Lewis	Lecturer, non-tenure-track (FT)	MEd, Education (Geography & History)	GEOG 103
Dr. Matthew Ramspott	Professor, tenured (FT)	PhD, Geography	ENSC 150, 485 GEOG 275, 413, 420
Ms. Jennifer Reynolds	Instructor, tenure-track (FT)	MA (ABD), Geography	GEOG 420, 430, 460, 473
Dr. Richard Russo	Associate Professor, tenured (FT)	PhD, Geography	GEOG 360
Dr. William Wetherholt	Associate Professor, tenured (FT)	PhD, Geography	GEOG 310, 420, 452

2. *Demonstrate how the institution will provide ongoing pedagogy training for faculty in evidence-based best practices, including training in a] pedagogy that meets the needs of the students; b] learning management systems; c] evidence-based practices for distance education, if offered.*

The university frequently offers online and face-to-face training opportunities for pedagogical improvement, including the annual Center for Teaching Excellence workshop and conference in January. Faculty supporting this major will also frequently complete training and webinars to stay current in the technology and software changes in the field.

J. Adequacy of Library Resources

1. *Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program.*

The Lewis J. Ort Library provides thousands of resources related to the disciplines that contribute to the proposed ENSC program. Accreditation program reviews of majors such as Biology, Earth Sciences, and Geography has demonstrated the adequacy of library resources in environmental studies. The library licenses

electronic resources that provide access to full-text articles, statistical data, and reference material, including Academic Search Complete. There are approximately 37,000 full text journals, magazines, and newspapers available through the total number of databases subscribed to by the library. The scope of these resources range from trade journals and newspapers to scholarly research. The library's OneSearch and Research Port search systems provide access to databases and other electronic resources through the Internet to all currently registered FSU students, faculty and staff on a 24 hour/7-day basis. Materials comprising the library's collection may be searched using its online catalog, catalogUSMAI, as well as OneSearch. A cooperative sharing program between USM institutions provides students, faculty, and staff with borrowing privileges for circulating print materials from any USM library. Additionally, interlibrary loan capabilities extend these privileges to libraries throughout the United States.

K. Adequacy of Physical Facilities, Infrastructure and Institutional Equipment

1. *Provide an assurance that physical facilities, infrastructure and instructional equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and faculty offices, and laboratories for studies in STEM fields.*

Recent Middle States program reviews for programs in the departments of Biology, Chemistry and Geography have shown that the physical facilities and instructional infrastructure adequately support program learning objectives and student preparation for post-graduation careers and graduate study.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14)

The budget assumes a 3 percent increase annually. The program will be offered using existing faculty and resources at FSU. For the budget tables on the last page:

Table 1 Narrative

1. Reallocated Funds: Three full-time faculty will have 0.25 of their time relocated to teaching new courses in the program, representing 0.75 FTE.
2. Tuition/Fee Revenue: Under Tuition and Fee Revenue the assumptions include an increase in enrollment from 11 in year one to 22 in year five (a doubling), with 10% of students from out-of-state. Tuition increases of 3 % annually.
3. Grants, Contracts & Other External Sources: N/A
4. Other Sources: N/A
5. Total: Tuition and Fee Revenue the assumptions include 90% Maryland residents and 10% out-of-state and a 3% annual increase in tuition and fees.

Table 2 Narrative

1. Faculty: FSU is reallocating 25% of three full-time faculty (.075 FTE) to teach new courses in the program.
2. Administrative and Support Staff: N/A
3. Equipment and Library: N/A
4. New or Renovated Space: N/A
5. Other Expenses: N/A
6. Total: The budget assumes a 3 percent increase annually in tuition and fees. No additional financial resources are required.

Environmental Studies Major

TABLE 1: RESOURCES					
	FY2023	FY2024	FY2025	FY2026	FY2027
Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	47,922	49,360	50,840	52,366	53,937
2. Tuition/Fee Revenue	122,724	126,405	182,203	214,643	276,246
(c + g below)	0	0	0	0	0
a. Number of F/T Students In-state	10	10	15	15	20
a. Number of F/T Students Out-of-state	1	1	1	2	2
b. Annual Tuition/Fee Rate In-state	9,804	10,098	10,401	10,713	11,034
b. Annual Tuition/Fee Rate Out-of-state	24,684	25,425	26,188	26,974	27,783
c. Total F/T Revenue (a x b)	122,724	126,405	182,203	214,643	276,246
d. Number of P/T Students In-State	0	0	0	0	0
d. Number of P/T Students Out-of-State	0	0	0	0	0
e. Credit Hour Rate In-State	286	295	304	313	322
e. Credit Hour Rate Out-of-State	612	630	649	668	688
f. Annual Credit Hours	24	24	24	24	24
g. Total P/T Revenue In & Out-of-State (d x e x f)	0	0	0	0	0
3. Grants, Contracts & Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 – 4)	170,646	175,765	233,043	267,009	330,183
TABLE 2: EXPENDITURES					
	FY2023	FY2024	FY2025	FY2026	FY2027
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	47,922	49,360	50,840	52,366	53,937
a. # FTE	0.75	0.75	0.75	0.75	0.75
b. Total Salary	47,922	49,360	50,840	52,366	53,937
c. Total Benefits	0	0	0	0	0
2. Admin. Staff (b + c below)	0	0	0	0	0
a. # FTE	0	0	0	0	0
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
3. Support Staff (b + c below)	0	0	0	0	0
a. # FTE	0.00	0.00	0.00	0.00	0.00
b. Total Salary	0	0	0	0	0
c. Total Benefits	0	0	0	0	0
4. Equipment	0	0	0	0	0
5. Library	0	0	0	0	0
6. New or Renovated Space	0	0	0	0	0
7. Other Expenses	0	0	0	0	0
TOTAL (Add 1 – 7)	47,922	49,360	50,840	52,366	53,937
Surplus	122,724	126,405	182,203	214,643	276,246
ASSUMPTIONS:					
Based on incoming new students.					
If current students, revenue & expenses would be less or flat.					
Three FT Faculty at 25% FTE. Reallocated.					
Approx. 12 credits per semester.					
Increase enrollment until 4th year, then flat.					

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15)

2. *Discuss procedures for evaluating courses, faculty and student learning outcomes.*

Faculty members at Frostburg State University are evaluated annually by a peer evaluation process that includes student evaluation of instruction data for each course. The student evaluation instrument is common to all courses at FSU and is administered by the Office of Assessment and Institutional Research.

Student learning outcomes for the program will be assessed on an annual basis in ENSC 485 (Environmental Science Capstone), using a portfolio-based rubric linked to the established student learning outcomes for the program.

2. *Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.*

All academic programs at FSU undergo an intensive program review every seven years as required by the University System of Maryland and the Middle States Commission on Higher Education. This review covers educational and cost effectiveness, assessment of learning outcomes (based on mechanisms described above), and adequacy of human, capital, and fiscal resources as well as an external reviewer's report on program strengths and weaknesses.

Halfway through the program review cycle, FSU's Office of Assessment and Institutional Research collects information on enrollment and assessment activities using a midterm review template. Also at this time, the Institutional Priorities and Resources Committee will review the program to determine if the program is meeting its enrollment projections and receiving the required resources.

N. Consistency with the State's Minority Student Achievement Goals

(as outlined in COMAR 13B.02.03.05)

1. *Discuss how the proposed program addressed minority student access & success, and the institution's cultural diversity goals and initiatives.*

COMAR 13B.02.03.05 calls for the "expansion of educational opportunities and choices for minority and educationally disadvantaged students at institutions of higher education." The proposed ENSC program is open to all FSU undergraduates without restriction. Currently (fall 2022), FSU's undergraduate student population is 36% minority and 35% Pell Grant recipients, showing that the institution supports the educational goals of minority and economically disadvantaged students of all backgrounds.

Frostburg State University affirms its commitment to a campus environment which values human diversity and respects individuals who represent that diversity. Fostering diversity and respect for difference is a fundamental goal of higher education, ranking among the highest priorities of this institution.

Beyond the institutional commitment to diversity, equity, and inclusion, the Environmental Science program will serve all students who enroll in its courses and seek to reduce the retention and graduation gaps between minority and non-minority students. Faculty on the program steering committee will have ongoing conversations about how course content and assignments can better support the holistic development of minority students by focusing on the sources used, cases studies profiled, and voices heard in lectures, assignments, and readings. Senior students will be paired with newly declared majors to act as mentors and role models. The program will seek financial support for peer-mentoring from the FSU Foundation and both internal

and external grants. The program will work actively with state and national efforts to increase minority representation in STEM programs and careers to place out students in competitive internships and programs.

O. Relationship to Low Productivity Programs Identified by the Commission

1. *If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including faculty, administration, library resources and general operating expenses) may be redistributed to this program.*

The proposed Environmental Studies program seeks to replace the low-productivity Environmental Analysis and Planning (EVAP) program that is currently in suspension and was also a joint program between the departments of Biology and Geography. Some faculty connected to the EVAP program have either retired or moved on to other institutions. The credit-heavy and prescriptive EVAP program had an adequate number of students enrolled, but those students often had to switch to a related major for degree completion, which explains the low-productivity in degrees awarded in EVAP.

While current faculty in Biology and Geography are fewer in number, they do support the coursework in the proposed ENSC program. Since courses also serve students in other programs offered by these departments, any redistribution of resources would be internal to departments which will cover the two new ENSC courses included in the proposal.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.

N/A

2. *Provide assurance and any appropriate evidence that the institution complies with C-RAC guidelines, particularly as it relates to the proposed programs.*

N/A

APPENDIX A. Proposed Major: Environmental Science (60-68 credits)

Required Program Core (11 courses / Credits: 39-40)

ENSC Core (6 credits)

ENSC 150 Intro to Environmental Science [new 4 credit lab course]
ENSC 485 Environmental Science Capstone [new]

BIOL Core (12 credits)

BIOL 149
BIOL 160 or 161
BIOL 340

CHEM Core (8 credits)

CHEM 201
CHEM 202

GEOG Core (7-8 credits)

GEOG 103
GEOG 205 or 207

MATH Core (6 credits)

MATH 109
MATH 119

Advanced Electives (5 courses / Credits: 15 to 20)

In consultation with advisor, choose 5 courses across at least two disciplines that align with career and/or graduate education goals:

BIOL 230, 304, 309, 313, 328, 403, 405, 406, 409, 411, 412, 414, 417, 420, 422, 423, 425, 426, 430, 439, 450, 456, 460
CHEM 311 & 312, 320, 341, 420, 460
GEOG 208, 275, 300, 317, 330, 340, 360, 380, 405, 406, 413, 420, 430, 433, 441, 445, 452, 460, 469, 473, 475, 477, 492

Senior Research Experience (or two additional advanced electives / Credits: 6 to 8)

GEOG 482 and GEOG 483

or

BIOL 493 and/or BIOL 494 (to equal 6 credits)

Students will be encouraged to complete a minor in: Biology, Chemistry, Climate Science, Earth Science, Forestry, Geography, Sustainability Studies

Course descriptions for courses included in the ENSC program

ENSC courses

ENSC 150 – Introduction to Environmental Science (4cr): An introduction to the systems science that seeks to identify and analyze natural and human-made problems in the natural environment. Includes a survey of fundamental concepts such as ecosystems and biodiversity, energy transfer, land and water use, energy resources, pollution, and global change. Application of science skills and practices. Three hrs. lecture, 2 hrs. lab. Every semester. GEP Group C.

ENSC 485 – Environmental Science Capstone (2cr): Creation of a portfolio comprised of examples of student work and an associated narrative demonstrating achievement of the established learning goals for the Environmental Science major. Professional development exercises: access information on career opportunities, resumes, cover letters. 2cr. lecture

BIOL courses

BIOL 149 – General Biology I (4cr): Biological principles and concepts. The life processes, development and relationship among organisms. Three hrs. lecture, 2 hrs. lab. Every semester. GEP Group C.

BIOL 160 – General Zoology (4cr): Biology of animals and evolution of animal diversity. Study of ecological interactions among animals and their physicochemical and biological environments. Three hrs. lecture, 2 hrs. lab. Required for biology majors. Every semester. Prerequisite: BIOL 149.

BIOL 161 – General Botany (4cr): Botanical concepts and principles about algae and land plants. Emphasis on their origin, evolution, classification of major groups with typical life cycles and characteristics, general morphology and physiology of vascular plants, and plant ecology. Required for biology majors. Three 1-hr. lectures, one 2-hr. lab. Every semester. Prerequisite: BIOL 149.

BIOL 230 – Wildlife Techniques (3cr): Study and management of wildlife species. Capture, marking, physiological indices, food habits and nutrition, sex and age, population and habitat analysis. Current management practices. Two hrs. lecture, 3 hrs. lab. Fall. Not open to students who have credit for former BIOL 330. Prerequisite: BIOL 149

BIOL 304 – Microbiology (4cr): Microorganisms, especially their form, structure, reproduction, physiology, metabolism, and identification, will be studied with emphasis on their distribution in nature, their beneficial and detrimental effects on humans, and the physical and chemical changes they make in the environment. Two hrs. lecture and two 2-hr. labs. Every semester. Prerequisites: BIOL 149 with a “C” or better. Co-requisite: CHEM 201 or CHEM 150.

BIOL 309 – General Entomology (4cr): Identification, morphology, physiology, development, geological history, ecology and control of insects. Two hrs. lecture, two 2-hr. labs. Fall, odd-numbered years. Prerequisite: BIOL 160.

BIOL 313 – Plant Evolution and Diversity (4cr): Origin, evolution and diversity of algae, bryophytes, ferns, gymnosperms and angiosperms. Comparative study of life history, morphology and of representatives of major groups. Two 1-hr. lectures, two 2-hr. labs. Spring of odd-numbered years. Prerequisite: BIOL 161.

BIOL 328 – Economic Botany (3cr): Study of plants and the link between plant structure and human’s use of plants. Students will gain an understanding of the form and function of the plant body; plant nomenclature; history of plant use; origins of economically important plants; use of flowers and fruits for food and other purposes; use of roots, stems and leaves for food and other purposes. One hr. lecture, one 4-hr. lab. Spring, odd-numbered years. Recommended: BIOL 128 and 161.

BIOL 340 – General Ecology (4cr): Environmental relationships of plants and animals. Field laboratory experience. Measuring environmental variables in terrestrial and aquatic ecosystems. Two hrs. lecture, one 4-hr. lab. Every semester. Prerequisites: BIOL 160 or 161; CHEM 201; MATH 109/209

BIOL 403 – Plant Physiology (4cr): Higher-plant growth and differentiation. Case-study method. Topics include general differentiation, photometabolism, translocation and water relations. Three hrs. lecture, 3 hrs. lab. Fall of even-numbered years. Prerequisite: BIOL 161.

BIOL 405 – Dendrology (3cr): Collection, identification and study of native and introduced woody plants in summer and winter conditions. One hr. lecture, one 4-hr. lab. Fall. Prerequisite: BIOL 161.

BIOL 406 – Ornithology (4cr): Anatomy, physiology, behavior, ecology and evolution of birds. Laboratory emphasis on identification of regional birds at the species and family level. Two hrs. lecture, one 4-hr. lab. Binoculars required. Spring. Prerequisite: BIOL 149 or BIOL 160.

BIOL 409 – Plant Taxonomy (3cr): Classification of flowering plants, gymnosperms and ferns. Emphasis on collection, identification and preparation of herbarium specimens. One hr. lecture, one 4-hr. lab. Spring. Prerequisite: BIOL 161

BIOL 411 – Invertebrate Zoology (4cr): Structure, physiology, life history and natural history of invertebrate groups. Emphasis on local fauna. Two hrs. lecture, two 2-hr. labs. Spring, odd-numbered years. Prerequisite: BIOL 160

BIOL 412 – General Parasitology (4cr): Principles of parasite structure, function, life cycles and host-parasite relationships. Two hrs. lecture, two 2-hr. labs. Spring, odd-numbered years. Prerequisites: BIOL 160, CHEM 202.

BIOL 414 -- Quantitative Analysis of Vertebrate Populations (3cr): A survey of quantitative techniques used to describe, analyze and model vertebrate wildlife population phenomena and interactions between populations. Two hrs. lecture, one 3-hr. lab. Fall. Prerequisites: MATH 120 or a course in calculus, MATH 109/209; BIOL 160 or 161

BIOL 417 – Ichthyology (3cr): The study of fishes, with emphasis on structure and function, development, behavior, ecology and systematics. Two hrs. lecture, one 2-hr. lab. Fall, even-numbered years. Prerequisite: upper-class standing in biology or wildlife/fisheries management

BIOL 420 – Fish Management and Culture (3cr): Contemporary problems in fisheries management. The study of fish culture; alternatives of commercial harvest and culture. Field trips. Three hrs. lecture. Spring, odd-numbered years. Prerequisite: senior or graduate standing, MATH 109/209 or permission of instructor.

BIOL 422 – Herpetology (3cr): The structure, behavior, ecology, evolution and taxonomy of amphibians and reptiles. Laboratory emphasis on identification, anatomy and ecology of local species; techniques of collecting, estimating population sizes, home ranges. Two hrs. lecture, one 3-hr. lab. Spring. Prerequisite: BIOL 160

BIOL 423 – Mammalogy (4cr): the structure, taxonomy, behavior, ecology, evolution and public health significance of mammals, and history of the science of mammalogy. Laboratory emphasizes anatomy, identification, capture techniques, habitat analysis, and home-range and population characterization. Three hrs. lecture, one 3-hr. lab. Fall. Prerequisite: BIOL 160 or permission of instructor.

BIOL 425 – Forest Ecology and Conservation (3cr): The investigation of forest ecology, management, conservation, policy, research and history. Silviculture, stand dynamics, stand improvement, reforestation, soils, disturbances and natural pests and pathogens. Investigation of interrelated patterns and processes of forest communities. Forest products and measurements. Many field trips to measure, study and understand local forests. Two hrs. lecture, one 2-hr. lab. Fall. Prerequisite: BIOL 161.

BIOL 426 – Vertebrate Zoology (4cr): The biology of vertebrates: origin, evolution, classification, structure, ecology, reproduction. Identification of regional examples. Three hrs. lecture, one 2-hr. lab. Spring, even numbered years. Prerequisite: BIOL 160.

BIOL 430 – Introductory Limnology (4cr): Inland waters; physical, chemical, and biological aspects. An overview of hydrobiology. Laboratory emphasis on basic analysis of data from aquatic environments. Two hrs. lecture, two 2-hr. labs. Fall, odd numbered years. Prerequisite: BIOL 340.

BIOL 439 – Environmental Toxicology (3cr): Interdisciplinary study of the major classes and properties of pollutants, ecotoxicology testing methods and their effects on living organisms and the ecosystem. Two hrs. lecture, two hrs. lab. Variable. Prerequisites: BIOL 149 and CHEM 202.

BIOL 450 – Ecology and Management of Wildlife Populations (3cr): Study of the factors that determine the distribution and abundance of wildlife populations and current management practices used to manipulate wildlife populations. Two-three field trips will be used to gain knowledge of regional management practices. Three hrs. lecture. Fall. Prerequisites: BIOL 340, and one from 406, 423 or 426.

BIOL 456 – Advanced Microscopy (4cr): Principles and techniques of light microscopy and scanning electron microscopy. Preparation of biological specimens for light microscopy (including immunofluorescence) and scanning electron microscopy. Two hrs. lecture, two 2-hour labs. Spring, odd-numbered years. Prerequisite: cumulative GPA 3.0 or higher, BIOL 304 or 404, or permission of instructor.

BIOL 460 – Forestry Field Practice (3cr): A field-oriented overview of basic forestry. Includes field dendrology, silvics, elements of surveying and mapping, orienteering, log scaling, silviculture, timber cruising, and wildlife techniques. Numerous field trips to regional forests. Summer Session, odd-numbered years. 1 cr. lecture, 2 cr. lab. Prerequisites: BIOL 405 and BIOL 425.

BIOL 493 – Advanced Biology Research (3cr): Original student research mentored by a faculty member that will involve literature searches, experimental design, and analysis. Poster presentation methods and results at local, regional or national meeting required as final product. Department of Biology Chair approval before registration for the course. Repeatable for a maximum of 9 credits. Only 3 credits of this course can be used as a Biology elective. Variable. Prerequisite: permission of instructor.

BIOL 494 – Field Experiences in Biological Sciences (2-6cr): Work experience related to the student's major. Faculty sponsor, project approval and final report by the student required. Variable. Repeatable for maximum of 12 credits. Prerequisites: biology, wildlife & fisheries, or interpretive biology and natural history majors only; junior or senior standing.

CHEM Courses

CHEM 201 – General Chemistry I (4cr): Atomic and molecular structure, theories of covalent and ionic bonding, chemical reactions, states of matter, gas laws, solutions, reaction rates, stoichiometry and thermochemistry. Two hrs. lecture, 2 hrs. discussion and one 2-hr. lab. Every semester. You cannot earn credit for both CHEM 101 and 201. Prerequisite: placement at Math Level II. Corequisite: MATH 102/119, placement at Math Level III or higher or permission of instructor. GEP Group C.

CHEM 202 – General Chemistry II (4cr): Acid-base concepts, equilibria, thermodynamics, electrochemistry, reaction rates, coordination compounds, and organic, nuclear, and descriptive chemistry. Three hrs. lecture, one 3-hr. lab. Every semester. You cannot earn credit for both CHEM 102 and 202. Prerequisites: CHEM 201 and MATH 102/119.

CHEM 311 – Organic Chemistry I (3cr): Chemistry of the compounds of carbon. Classes and nomenclature of compounds, structure, reactions, mechanisms, spectroscopy, and stereochemistry. Three hrs. lecture. Every semester. Not open to students who have credit for former CHEM 301. Prerequisites: CHEM 202 or equivalent. Corequisite: CHEM 312.

CHEM 312 – Organic Chemistry I Laboratory (1cr): Introduction to techniques of experimental organic chemistry: separations, purifications, spectroscopy, mechanistic analysis. One 3-hr. lab. Every semester. Not open to students who have credit for former CHEM 301.

Prerequisite: CHEM 202 or equivalent. Corequisite: CHEM 311.

CHEM 320 – Quantitative Analytic Chemistry (4cr): Theory, methods and treatment of data pertaining to chemical analysis. Gravimetric, volumetric, potentiometric, electroanalytical and spectrophotometric applications in the laboratory. Three hrs. lecture, one 3-hr lab. Fall. Prerequisites: CHEM 202, MATH 120 or equivalent or permission of instructor.

CHEM 341 – Introduction to Geochemistry (4cr): Intro to chemical systems and processes of Earth; basic chemistry principles applied to environmental processes, including, but not limited to distribution of elements, chemical reactions, and geochemical cycles. Applying geochemistry techniques to investigate and examine natural and human-impacted environments. Two hrs. lecture, one 3-hr. lab. Spring. Also offered as GEOG 341. Prerequisite: CHEM 202

CHEM 420 – Environmental Chemical Analysis (4cr): Explores applications of wet chemical, electroanalytical (potentiometric and amperometric), spectroscopic (UV-Vis, spectrofluorimetry and AA) and chromatographic (HPLC, GC, GCMS, TLC) techniques for standard and trace analyses of water, soil, and tissue materials. Emphasis on application of standard protocols, development of experimental technique and sample preparation. Two 3 hr. lectures/lab. Spring, even-numbered years. Prerequisites: CHEM 202.

CHEM 460 – Environmental Chemistry (3cr): An investigation into the chemical nature of the environment. Development of the chemical interactions found in the atmosphere, hydrosphere, lithosphere, and biosphere. Energy and energy usage also discussed. Three hrs. lecture. Variable. Prerequisites: CHEM 202 and any of the following: BIOL 430, GEOG 432, CHEM 320 or 420.

GEOG Courses

GEOG 103 – Physical Geography (4cr): Earth-sun relations, map reading and interpretations, landforms, elements of weather and climate, and climate regions. Three hrs. lecture and 2 hrs. lab. Every semester. GEP Group C.

GEOG 205 – Descriptive Meteorology (3cr): Aspects of the atmosphere, weather variables and measurement, radiation, clouds and precipitation, atmospheric stability, air masses and severe weather. Principles of weather forecasting. Also offered as PHSC 205. Spring. GEOG 103 recommended.

GEOG 207 – Physical Geology and Geomorphology (4cr): A process oriented approach to develop a fundamental understanding of geology and geomorphology. Experiential laboratory and field experiences of subsurface and surficial interactions with tectonic, hydrologic and atmospheric processes. At least one field trip will be required. Three hrs. lecture and 2 hrs. lab. Not open to students who have credit for former GEOG 307. Fall.

GEOG 208 – Earth System History (4cr): Chronology of the Earth's history from hypothesized origins through the Holocene. Paleogeography, paleotectonics, and floral and faunal evolution. Lab study of sediments, fossils as indicators of rock age and environment, and geologic maps and structure sections. One field trip may be required. Three hrs. lecture and 2 hrs. lab. Not open to students who have credit for former GEOG 308. Spring.

GEOG 275 – Fundamentals of Geographic Data Handling (3cr): Exploring sources, characteristics and types of geospatial data. Discussion of techniques for manual and automated handling of geographically referenced information. Two hrs. lecture and 2 hrs. lab. Every semester. Prerequisites or co-requisites: GEOG 103 (or 113) and MATH 109/110, or MATH 119 or Math 220 or a higher-level math course or placement at Math Level III, or permission of instructor. Tech. fluency

GEOG 317 – Principles of Geographic Information Science (4cr): An examination of the basic theory, concepts, data structures, operations and applications of geographic information systems (GIS) as a science. Lectures supplemented by computer-based laboratory exercises. Three hrs. lecture and 2 hrs. lab. Fall. Prerequisites: GEOG 275 or permission of instructor. GEOG 310 recommended.

GEOG 330 – Global Climate Change (3cr): What causes Earth's climate to change? is one of the most important questions of our time. This course includes the evaluation of the natural and anthropogenic factors that cause a change in global and regional climates. Modern climate changes, future climate scenarios, policy, and mitigation strategies will also be explored. Spring, even numbered, years. Prerequisites: GEOG103/113

GEOG 340 -- Soil: Genesis, Nature and Characterization (3cr): Origin and processes of soil formation, change with time and environmental factors including use, identification and delineation on the landscape, and interpretation and usage of soil surveys. Two hrs. lecture and 2 hrs. lab./field session. Not open to students who have credit for former GEOG 440. Fall. Prerequisite: GEOG 207 completion or co-registration strongly recommended.

GEOG 360 – Food Systems (3cr): Geographic examination of the production, distribution and consumption of food. Cultural and spatial foundations of the global food system and its impacts on human and natural systems. Sustainable food systems. Fall, odd-numbered years.

GEOG 380 – Research Methods in Geography (3cr): Examines qualitative and quantitative methods for handling geo-spatial data. Design of geographic research, approaches to data collection and synthesis, inferential and descriptive geo-spatial statistics, application of statistical software, and presentation of findings. Two hrs. lecture and 2 hrs. lab. Spring. Prerequisites: GEOG 275 and 9 hrs. of geography or permission of instructor.

GEOG 405 – Physical Climatology (3cr): Overview of the physical processes that define Earth's global climate. Movement of energy and water throughout the climate system, global circulation, distribution of climate types, natural and anthropogenic controls of climate, land-atmosphere interactions, spatial and temporal patterns, climate variability and change, and analysis of climate data. Two hrs. lecture and 2 hrs. lab. Fall. Prerequisite: GEOG 103/113 and placement at Math Level 2 or above, or a C or better in a credit bearing mathematics course, or permission of instructor.

GEOG 406 – Management and Conservation of Natural Resources (3cr): Current problems associated with the use and misuse of natural resources. Fall. Prerequisites: GEOG 103/113 and GEOG 104/114 or GEOG 110 or permission of instructor.

GEOG 413 – Remote Sensing - Image Interpretation (3cr): Fundamental principles of remote sensing and image interpretation applications in geography; the remote sensing process, Earth surface energy/matter interactions, photogrammetry basics, color theory and digital image display, introductory digital image processing and a survey of image types including panchromatic, color-infrared, multispectral, thermal and radar. Two hrs. lecture and 2 hrs. lab. Fall. Prerequisite: GEOG 275 or permission of instructor.

GEOG 420 – Topics in Mapping and Geospatial Sciences (3cr): A project-based course covering advanced topics in the mapping sciences and geospatial intelligence. Topics may include digital image processing, advanced cartographic design and/or geospatial analyses. Two hrs. lecture/discussion and 2 hrs. lab per week. May be repeated for up to 6 hours provided the topics are different. Spring. Prerequisites: GEOG 275, GEOG 310, GEOG 317, and GEOG 413 or permission of instructor.

GEOG 430 – Surface Water Hydrology (4cr): Physical principles governing occurrence and movement of water, including precipitation, evaporation and transpiration, runoff, infiltration, soil water movement, and stream channel morphology. Lab/field experience with stream gauging, infiltration measurement, soil hydraulic conductivity, flow

frequency analysis and related phenomena. Human influence on surface water hydrology. Three hrs. lecture and 2 hrs. lab. Spring. Prerequisite: GEOG 103/113 or permission of instructor.

GEOG 433 – Surveying and Field Techniques (3 cr): Theory of measurements, computation and instrumentation; field work, use of Global Positioning Systems (GPS) and compilation of topographic base maps; evaluation of errors; profiling, grading, slope and grade stakes. Fieldwork will include use of a variety of instruments. One hr. lecture and 4 hrs. lab. Variable.

Recommended: GEOG 275.

GEOG 441 – Soil Analysis (3cr): Physical and chemical characteristics of soils as they relate to suitability for plant growth and reproduction. Laboratory and field testing of soil and soil-forming material. Physical properties of soil, moisture relationships, organic matter content and chemical constituents. Two hrs. lecture and 2 hrs. lab/field session. Fall. Prerequisite: GEOG 340 or permission of instructor.

GEOG 445 – Biogeography (3cr): Patterns of plant and animal distributions in the landscape are stressed and are considered in light of historical, environmental and biotic influences. Historical development of contemporary regional distributions, survey of world biomes and the importance of disturbance and human-induced changes on biotic distributions are considered. Variable. Prerequisite: GEOG 103 (or 113) or BIOL 149. BIOL 340 is recommended.

GEOG 452 – Rural Geography (3cr): Issues related to rural places, including population, livelihoods, environmental concerns, and trends. Topics may include exploration of rural geography concepts and research; examination of social, cultural, and environmental issues for rural areas and small towns; and concerns related to sustainability of rural livelihoods and communities. Spring, even-numbered years.

GEOG 460 – Natural Hazards in the Physical Environment (3cr): Study of hazards to human society arising from wind, water and earth either independently or from human activities. Perception, prevention and mitigation of hazards; spatial distribution and impact on global populations. Fall. Prerequisite: GEOG 103 or permission of instructor.

GEOG 469 – Principles of Atmospheric Science (3cr): Introduction to forecasting, weather models, and physical dynamics of the atmosphere. Large-scale processes and horizontal flow, small-scale processes and the vertical dimension, Newton's laws of Motion, conservation of mass and energy, radiation, thermodynamics, and angular momentum. Spring of odd numbered years. Prerequisite: GEOG 205/PHSC 205 or GEOG405 and placement at Math Level 2 or above, or a C or better in a credit-bearing mathematics course, or permission of instructor

GEOG 473 – Environmental Law (3cr): A survey of federal and state environmental laws and regulations. History and role of environmental regulation related to air and water pollution, waste disposal and resource development. Fall.

GEOG 475 – Advanced Geomorphology (3cr): Investigation of the synergy between the processes of aeolian (wind), hydrologic (water), tectonic (geologic) and the cryosphere (snow and ice) that shape the surface of the Earth. Exploration and classification of landforms of laboratory and field date utilizing and undertaking techniques such as; geomorphological mapping, sedimentology, environmental evidence and numeric models. Field trips to apply and practice data collection methodologies are required. Two hrs. lecture, 2 hrs. lab. Spring, odd-numbered years. Prerequisites: GEOG 207 or 208 or permission of instructor.

GEOG 477 – Advanced Geology (3cr): An in-depth examination of the Earth's origin, interior, and crustal materials; the geologic processes which have built up, deformed, weathered, and eroded the crust throughout deep time: the environmental interrelationships between humans and geologic processes and resources. By examining relating evidence of geologic processes, it is possible to examine the factors that initiate, drive and determine planetary evolution. Field component required. Two hrs. lecture, 2 hrs. lab. Spring, even-numbered years. Prerequisite GEOG 207 or permission of the instructor.

GEOG 482 – Senior Project I (3cr): First stage of the Senior Project, preparation and development of project design, identification of appropriate research methods, detailed project plan, initial background research (literature review) and preliminary data collection. Presentation in written report. Graded A/F. Every semester. Prerequisite: Senior standing, minimum 15 hours of geography, GEOG 380 or permission of instructor.

GEOG 483 – Senior Project II (3cr): Concluding stage of the Senior Project. Collection, presentation, analysis, interpretation, discussion and conclusions of original research by written thesis and oral exhibition. Graded A/F. Every semester. Prerequisite: GEOG 482.

GEOG 492 – Internship: Research in Geography (3cr): Academic component of internship. Requires co-registration in 495. Graded A-F. Every semester, summer.

MATH Courses

MATH 109 – Elements of Applied Probability and Statistics (3cr): For the non-math major; less rigorous than MATH 380. Elementary probability theory; collection, organization and analysis of data; descriptive statistics; the normal and binominal distributions; introduction to inferential statistics; and applications. Every semester. Prerequisite: a passing score on the Mathematics Placement test administered by the University or DVMT 095. **MAY NOT BE USED TO SATISFY THE REQUIREMENTS FOR A MAJOR OR MINOR IN MATHEMATICS. MAY BE USED TO FULFILL CORE SKILL 3.**

MATH 119 – College Algebra (3cr): Functions and their graphs, inverse functions, solutions of equations and inequalities, polynomial and rational functions, exponential and logarithmic functions, systems of equations and matrices. Every semester. Prerequisite: A passing score on the Mathematics Placement Test administered by the University or a grade of B or better in DVMT 100.

APPENDIX B. – 8-Semester Plan for Environmental Science (ENSC) Major

Semester 1 - Fall				
	Credit	Major	Other	GEP
ENGL 101 – First-Year Composition	3			CS1
ENSC 150 – Intro Env Science	4	X		C
MATH 119 – College Algebra	3	X		CS3
ORIE 101 – Intro. to Higher Education	1		X	
GEP Fine & Performing Arts	3			A
Semester Total	14			

Semester 2 - Spring				
	Credit	Major	Other	GEP
GEOG 103 – Physical Geography	4	X		C
BIOL 149 – General Biology	4	X		C
IDIS/SUST 155 – First-Year FSU Colloq.	3			E
GEP Humanities	3			B
GEP Social Science (GEOG 104 rec.)	3			D

Semester Total	17			
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Semester 3 - Fall				
	Credit s	Major	Other	GEP
CHEM 201	4	X		C
GEOG 205 or 207	3/4	X		
MATH 119	3	X		CS3
GEP Humanities	3			B
GEP Social Science	3			D
Semester Total	16/17			

Semester 4 - Spring				
	Credit s	Major	Other	GEP
CHEM 202	4	X		
BIOL 160 or 161	4	X		
Advanced ENSC Elective 1	3/4	X		
GEP Identity & Difference	3			F
Elective	3			
Semester Total	14/15			

Semester 5 - Fall				
	Credit s	Major	Other	GEP
BIOL 340	4	X		
Advanced ENSC Elective 2	3/4	X		
Advanced ENSC Elective 3	3/4	X		
ENGL 3xx – Advanced Writing	3			CS2
Elective	3			
Semester Total	16/17			

Semester 6 - Spring				
	Credit s	Major	Other	GEP
Advanced ENSC Elective 4	3/4	X		
Advanced ENSC Elective 5	3/4	X		
Elective (300-400)	3			
Elective (300-400)	3			
Elective (300-400)	3			
Semester Total	15/17			

Semester 7 - Fall				
	Credit s	Major	Other	GEP

Senior ENSC Req 1	3	X		
Elective (300-400)	3			
Elective (300-400)	3			
Elective (300-400)	3			
Elective	3			
Semester Total	15			

Semester 8 - Spring				
	Credits	Major	Other	GEP
Senior ENSC Req 2	3	X		
ENSC 485 Capstone	2	X		
Elective (300-400)	3			
Elective (300-400)	3			
Elective	3			
Semester Total	14			

Total Credits: 121 to 126

Appendix C

**ACADEMIC PROGRAM ARTICULATION AGREEMENT BETWEEN
HAGERSTOWN COMMUNITY COLLEGE
AND
FROSTBURG STATE UNIVERSITY REGARDING TRANSFER FROM ASSOCIATE
OF SCIENCE IN ENVIRONMENTAL STUDIES TO BACHELOR OF SCIENCE IN
ENVIRONMENTAL SCIENCE**

This Academic Program Articulation Agreement ("Agreement") is entered into by and between Hagerstown Community College (the "Sending Institution") and Frostburg State University (the "Receiving Institution") (collectively, the "Institutions") to facilitate the transfer of academic credits from Associate of Science in Environmental Studies, HEGIS code 491002 and CIP code 030103 for the completion of Bachelor of Science in Environmental Science, HEGIS code 040100 and CIP code 260101.

A. Qualifying Students

This Agreement pertains to the transfer of "Qualifying Students", *i.e.*, those students who:

1. Have successfully completed the program at the Sending Institution;
2. Are enrolled in the Sending Institution, in good standing; and
3. Are accepted for admission to the Receiving Institution.

B. Responsibilities of the Institutions

The Institutions agree to implement the transfer of Qualifying Students in accordance with applicable law and the following requirements and protocols:

1. A Qualifying Student may transfer from the Sending Institution into the Receiving Institution for the completion of the Program.
2. Students may transfer up to 70 credit hours. Only courses in which the student earns a grade of C or better will count toward satisfaction of major requirements. Courses that the Receiving School will accept credits towards completion of the Program include:

Sending Institution Course			Receiving Institution Comparable Course			
Course Number	Course Name	Credits	Course Number	Course Name	Credits	Applied to*
BIO 113	Principles of Biology I	4.0	BIOL 149	General Biology I	4.0	GEP Group C and Major
BIO 114	Principles of Biology II	4.0	BIOL 160	General Zoology	4.0	Major
CHM 103	General Chemistry I	4.0	CHEM 201	General Chemistry I	4.0	GEP Group C and Major
CHM 104	General Chemistry II	4.0	CHEM 202	General Chemistry II	4.0	Major
CHM 203	Organic Chemistry I	4.0	CHEM 311 & 312	Organic Chemistry I and Organic Chemistry I Lab	4.0	Major Elective
CHM 204	Organic Chemistry II	4.0	CHEM 321 & 322	Organic Chemistry II and Organic Chemistry II Lab	4.0	General Elective
ECO 201	Macroeconomic Principles	3.0	ECON 201	Princ Econ Macro	3.0	GEP Group D
ECO 202	Microeconomic Principles	3.0	ECON 202	Princ Econ Micro	3.0	General Elective
ENV201	Fundamentals of Environmental Science I	4.0	ENSC 150	Intro to Environmental Science	4.0	Major
ENV 202	Fundamentals of Environmental Science II	4.0	GEOG 195	Lower-level elective	4.0	General Elective
ENV 203	Environmental Policy and Regulations	3.0	GEOG 473	Environmental Law	3.0	Major Elective
ENV 204	Public Health and the Environment	3.0	BIOL 465	Environmental Health	3.0	Major Elective
ENG 101	English Composition	3.0	ENGL 101	First-Year Composition	3.0	GEP Core
ENG 102	Advanced English Comp	3.0	ENGL 150	Intro to Literature	3.0	GEP Group B
GEO 105	World Regional Geography	3.0	GEOG 110	World Regional Geography	3.0	GEP Group E
MAT 109	Statistics	3.0	MATH 109	Probability and Statistics	3.0	GEP Core and Major
MAT 160	Precalculus I	3.0	MATH 119	College Algebra	3.0	GEP Core and Major
MAT 161	Precalculus II	3.0	MATH 120	Precalculus	3.0	GEP Core or General Elective
MAT 203	Calculus I	4.0	MATH 236	Calculus I	4.0	GEP Core or General Elective
PHS 111	Earth Science	4.0	GEOG 103	Physical Geography	4.0	Major Core
POL 101	American Government	3.0	POSC 110	Intro to American Politics	3.0	GEP Group D
POL 102	State and Local Government	3.0	POSC 195	Lower-Level Elective	3.0	GEP Group D or General Elective

* Indicates if course is applied to General Education, Program/Major requirements, or General Elective at Frostburg.

- Only courses in which a student earns a C or better will count toward satisfaction of major requirements.

4. The Receiving Institution shall designate, and shall provide to the Sending Institution, the contact information for a staff person at the Receiving Institution who is responsible for the oversight of the transfer of Qualifying Students. The Sending Institution shall designate, and shall provide to the Receiving Institution, the contact information for a staff person at the Sending Institution who is responsible for the oversight of the transfer of Qualifying Students.

	Sending Institution	Receiving Institution
Name of staff person responsible for oversight	Laura Renninger	Natalie Wagoner
Title of staff person	Dean of Instruction	Director of Admissions
Email address	larenninger@hagerstowncc.edu	nmwagoner@frostburg.edu
Telephone Number	240-500-2437	301-687-4406

Should the staff person or position change, the institution will promptly provide new contact information to the partner institution and inform the Maryland Higher Education Commission of the change.

Additional contact information:

	Sending Institution	Receiving Institution
Name of person	Laurie Montgomery	Richard Russo
Title of person	Director, Mathematics and Science Division	Chair, Geography
Email address	lmontgomery@hagerstowncc.edu	rarusso@frostburg.edu
Telephone Number	240-500-2248	301-687-4053

5. If the Qualifying Student is using federal Title 38 VA Education Benefits (GI Bill® Education Benefits), the Institutions shall adhere to all applicable U.S. Department of Veterans Affairs' regulations, including the regulations governing the awarding prior credit, as regulated under Title 38, Code of Federal Regulations, Sections 21.4253(d)(3) and 21.4254(c)(4).
6. Each Institution shall adhere to all applicable transfer requirements set forth in the Annotated Code of Maryland and the Code of Maryland Regulations.
7. Each Institution shall advise students regarding transfer opportunities under this Agreement, and shall advise students of financial aid opportunities and implications associated with the transfer.

8. Should either Institution make changes to program requirements, the institution will inform the other Institution immediately. The articulation agreement should be updated to reflect the changes and forwarded to the Maryland Higher Education Commission.

C. Term and Termination

1. This Agreement shall be effective on the date that last signed by the appropriate and authorized representatives of each Institution ("Effective Date") and shall remain in effect for one (1) year. This agreement shall automatically renew for one (1) year terms, unless terminated as set forth below.
2. Either Institution may, at its sole discretion, terminate this Agreement upon delivering 60 days written notice to the other Institution and the Maryland Higher Education Commission. The Institutions agree that termination shall include an agreement that students currently enrolled in the program at the time of termination shall be permitted to complete the program as described herein.
3. Both Institutions agree to meet once every year to review the terms of this Agreement.

D. Amendment

1. This Agreement constitutes the entire understanding and agreement of the Institutions with respect to their rights and obligations in carrying out the terms of the Agreement, and supersedes any prior or contemporaneous agreements or understandings.
2. This Agreement may be modified only by written amendment executed by both Institutions.

E. Governing Law

This Agreement shall be governed by, and construed in accordance with, the laws of the State of Maryland.

F. Counterparts

This Agreement may be executed in counterparts, each of which shall be deemed to be an original, but all of which, taken together, shall constitute one and the same agreement. This Agreement may be executed by way of electronic signature and signature pages may be exchanged electronically, and such signatures will be deemed original signatures.

G. Notice of Agreement

1. The Institutions agree to provide a copy of this Agreement, with any amendments, to the Maryland Higher Education Commission.

2. The Institutions agree to provide copies of this Agreement to all relevant individuals and departments of the Institutions, including but not limited to students, academic department chairs participating in the transfer, offices of the president, registrar's offices, and financial aid offices.

H. No Third-Party Beneficiaries

There are no third-party beneficiaries to this Agreement.

I. Representations and Warranties of the Parties

Both Institutions represent and warrant that the following shall be true and correct as of the Effective Date of this Agreement, and shall continue to be true and correct during the term of this Agreement:

1. The Institutions are and shall remain in compliance with all applicable federal, state, and local statutes, laws, ordinances, and regulations relating to this Agreement, as amended from time to time.
2. Each Institution has taken all action necessary for the approval and execution of this Agreement.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives.

Hagerstown Community College

By: _____

James Klauber
President

Date

C. David Warner
Vice President for Academic Affairs and
Student Services

December 6, 2022

Date

Frostburg State University

By: _____

Ronald Nowaczyk
President

Date

Traki L. Taylor
Provost and Vice President for Academic
Affairs

Date

Laura Renninger
Laura Renninger
Dean of Instruction

12.7.22
Date

Michael Mathias
Michael Mathias
Interim Dean of Liberal Arts and Sciences

12/20/22
Date

Appendix A – Transfer Guide

FSU Requirements (B.S. degree = 120 credits)	FSU Courses / ENSC	HCC courses / ENV
General Education (40 credits)		
Introductory Composition (one course)	ENGL 101	ENG 101
Advanced Writing (one course)	5 options	N/A
Mathematics (one course)	MATH 109 (major req.)	MAT 109
A. Fine & Performing Arts	(one course required)	
	ART 100	ART 101
	DANC 110	DNC 101
	MUSC 110	MUS 101
	THEA 106	No HCC GenEd Equiv.
B. Humanities	(two courses required)	
	HIST 100	No HCC GenEd Equiv.
	FREN 101 or SPAN 101	FRN 101 or SPN 101
	ENGL 150 or ENGL 221	ENG 102* or No Equiv.
	PHIL 101 or PHIL 102	PHL 101 or PHL 103
C. Natural Sciences	(two courses required)	
	BIOL 149 (major req.)	BIO 113
	CHEM 201 (major req.)	CHM 103
	ENSC 150 (major req.)	ENV 201
	GEOG 103 (major req.)	PHS 111
	PHSC 100/1 or PHSC 203 or PHYS 215 or PHYS 261	No equiv. or PHS 104 or PHY 201 or No equiv.
	IDIS 160 or EXSS 200	No equiv. or BIO 206 / HEA102
D. Social Sciences	(two courses required)	
	ECON 200 or ECON 201	ECO 101 or ECO 201
	GEOG 104 or GEOG 110	No equiv. or GEO 105
	POSC 110 or POSC 113 or POSC 131	POL 101 or No equiv. or POL 206
	PSYC 150	PSY 101
	SOCI 100	SOC 101
E. FSU Colloquia / Interdisciplinary	(two courses required)	
	IDIS 150 or IDIS 155	No HCC equiv.
	IDIS 350 or extra course in A-D above	No equiv. or See above
F. Identity & Difference	(one course required)	(HCC Diversity course with FSU equivalent)
Other courses at HCC may transfer into FSU equivalencies in this category.	SOCI 224	ANT 201
	GEOG 110	GEO 105
	INST 150	HUM 214

Environmental Science Program (60-68 credits)		
Core Courses (all)		
1	ENSC 150	ENV 201
2	ENSC 485	No equiv.
3	BIOL 149	BIO 113 (see GenEd)
4	BIOL 160 or BIOL 161	
5	BIOL 340	
6	CHEM 201	CHM 103
7	CHEM 202	CHM 104
8	GEOG 103	PHS 111 (see GenEd)
9	GEOG 205 or GEOG 207	No HCC equivalents
10	MATH 109	MAT 109 (see GenEd)
11	MATH 119	MAT 160
Advanced Electives (5 Courses across at least two disciplines)		
BIOLOGY		
	BIOL 230	
	BIOL 304	BIO 205
	BIOL 309	
	BIOL 313	
	BIOL 328	
	BIOL 403	
	BIOL 405	
	BIOL 406	
	BIOL 409	
	BIOL 411	
	BIOL 412	
	BIOL 414	
	BIOL 417	
	BIOL 420	
	BIOL 422	
	BIOL 423	
	BIOL 425	
	BIOL 426	
	BIOL 430	
	BIOL 439	
	BIOL 450	
	BIOL 456	
	BIOL 460	
CHEMISTRY		
	CHEM 311/312	CHM 203
	CHEM 341	
	CHEM 420	
	CHEM 460	
GEOGRAPHY		
	GEOG 208	
	GEOG 275	
	GEOG 300	
	GEOG 317	
	GEOG 330	
	GEOG 340	

	GEOG 360	ENV 101
	GEOG 380	
	GEOG 405	
	GEOG 406	
	GEOG 413	
	GEOG 420	
	GEOG 430	
	GEOG 433	
	GEOG 441	
	GEOG 445	
	GEOG 445	
	GEOG 452	
	GEOG 460	
	GEOG 469	
	GEOG 473	ENV 203
	GEOG 475	
	GEOG 477	
	GEOG 492	
Senior Requirement (6-8 credits)		
	GEOG 482 and GEOG 483	
	or BIOL 493 and/or BIOL 494	
	or Two more advanced electives	

***Not an approved General Education Course at HCC**

