RESOLUTION TO APPROVE BACHELOR OF ARTS (B.A.)/ BACHELOR OF SCIENCE (B.S.) DEGREE DESIGNATION IN GEOGRAPHY

MATERIALS INCLUDED

- Resolution
- Degree Designation Proposal

BACHELOR OF ARTS (B.A.)/ BACHELOR OF SCIENCE (B.S.) DEGREE DESIGNATION IN GEOGRAPHY

Academic Area: College of Natural Resources and Environment

Requested initiation: Spring 2026

The Board of Visitors approved a Bachelor of Science degree designation in Geography in spring 2025. The Bachelor of Arts (B.A.)/ Bachelor of Science (B.S.) degree designation in Geography is requested to clarify the two designations for review by the State Council of Higher Education in Virginia (SCHEV).

Students pursuing the B.A. in Geography will develop broad, interdisciplinary knowledge with an emphasis on human and environmental geography, cultural and regional studies, and the social dimensions of spatial patterns. This pathway is well-suited for students interested in careers in urban and regional planning, policy analysis, education, international development, or sustainability work in nonprofit and government sectors.

Students pursuing the B.S. in Geography will engage in a more technically focused curriculum that emphasizes geospatial science, quantitative methods, and the physical science aspects of geography. Coursework will include hands-on training in data collection techniques (e.g., fieldwork, GPS mapping), spatial analysis, and technologies such as GIS, satellite imagery, and remote sensing. B.S. graduates will be prepared to conduct complex spatial analyses, identify trends and patterns in large datasets, and apply technical expertise in roles such as geographers, GIS analysts, cartographers, and remote sensing specialists across academia, industry, nonprofit organizations, and all levels of government.

RECOMMENDATION:

That the resolution to approve a Bachelor of Arts (B.A.)/ Bachelor of Science (B.S.) in Geography degree designation be approved and the proposal forwarded to the State Council of Higher Education for Virginia (SCHEV) for approval.

August 20, 2025

Table of Contents

Description of the Proposed Program 1
Program Background 1
Institutional Mission 1
Curriculum 2
Faculty Resources 9
Student Learning Assessment 9
Employment Skills 13
Justification for the Proposed Program 14
Response to Current Needs (Specific Demand) 14
Employment Demand 18
Duplication 19
Student Demand 22
Projected Resource Needs for the Proposed Program 23
Resource Needs 23
Appendices 28
Appendix A: Sample Plan of Study A-1
Appendix B: Course Descriptions B-1
Appendix C – Employment Demand Job Announcements C-1

Description of the Proposed Program

Program Background

Virginia Polytechnic Institute and State University (Virginia Tech) seeks approval for a Bachelor of Arts (B.A.)/ Bachelor of Science (B.S.) degree in Geography. The proposed B.A./B.S. degree program in Geography will be located in the College of Natural Resources and Environment, Department of Geography. The new degree program would be initiated in spring 2026.

The purpose of the proposed B.A./B.S. degree in Geography is to equip students with the knowledge and skills necessary for entry-level positions in fields such as geography, cartography, geographic information science (GIS), and remote sensing, or for graduate study in the physical or social sciences. The program will provide students with a strong foundation in the physical and human processes that shape the Earth's surface, including patterns of climate, landforms, ecosystems, population, and urbanization, as well as the interactions between people and their environments. All students will study core geographic theory, human-environment relationships, and methods for analyzing spatial data.

Students pursuing the B.A. in Geography will develop broad, interdisciplinary knowledge with an emphasis on human and environmental geography, cultural and regional studies, and the social dimensions of spatial patterns. This pathway is well-suited for students interested in careers in urban and regional planning, policy analysis, education, international development, or sustainability work in nonprofit and government sectors.

Students pursuing the B.S. in Geography will engage in a more technically focused curriculum that emphasizes geospatial science, quantitative methods, and the physical science aspects of geography. Coursework will include hands-on training in data collection techniques (e.g., fieldwork, GPS mapping), spatial analysis, and technologies such as GIS, satellite imagery, and remote sensing. B.S. graduates will be prepared to conduct complex spatial analyses, identify trends and patterns in large datasets, and apply technical expertise in roles such as geographers, GIS analysts, cartographers, and remote sensing specialists across academia, industry, nonprofit organizations, and all levels of government.

Institutional Mission

The proposed B.A./B.S. in Geography aligns well with the mission of Virginia Tech. The University's mission statement is:

> "Inspired by our land-grant identity and guided by our motto, *Ut Prosim* (That I May Serve), Virginia Tech is an inclusive community of knowledge, discovery, and creativity dedicated to improving the quality of life and the human condition within the Commonwealth of Virginia and throughout the world."

The proposed degree program aligns with the institution's mission of "improving the quality of life and the human condition within the Commonwealth of Virginia and throughout the world" by preparing students to analyze and address pressing global and regional challenges through geospatial technologies and geographic perspectives. With coursework spanning human-environment interactions, physical systems, cartography, GIS, remote sensing, and spatial analysis, the program equips graduates to interpret and solve complex geographical problems, reflecting the university's commitment to discovery, service, and global impact.

Curriculum

The proposed B.A./B.S. in Geography degree program will require 120 credit hours. Experiential learning will be required.

The core coursework will provide students with a foundation in geography, including both human and physical aspects and technical skills of the field. Students will learn fundamental concepts such as space, place, regions, human communities, cultures, and economies and their interaction with the environment. Coursework will train students to use spatial perspective to understand and analyze global issues, environmental systems, and human activities across different regions. Students will learn how human societies are shaped by their geographic environments. Students will also be trained to develop proficiency in spatial analysis, geographic literacy, cartography, and use of geospatial technologies to interpret satellite imagery, and analyze, interpret and communicate complex geographic data effectively. Students will learn to apply geospatial methods to analyze and design solutions to contemporary problems facing Virginia and the world, such as mapping past climate variations for an area or analyzing the dispersion of air pollutants and identifying pollution sources.

All students enrolled in the proposed degree program will complete a semester of experiential learning through participation in a study abroad experience, field experience, or undergraduate research under the direct supervision of a faculty member. The experiential learning activity offers students practical experience to apply theoretical knowledge and gain a better understanding of geographic concepts and issues. This can be achieved through a research project or field study in a chosen topic area, selected with guidance from a faculty member, or through a practical project as part of a study abroad program. For example, students might use geographic information systems to analyze forest carbon storage, evaluate the impact of new developments on natural areas, or use remote sensing to assess natural disaster damage.

New courses are denoted by an asterisk.

Program Requirements

Core Courses: 21 credit hours
GEOG 1004: Introduction to Human Geography (3 credits)
GEOG 1014: World Regions (3 credits)
GEOG 1084/FREC 1004: Digital Planet (3 credits)

GEOG 1104: Introduction to Physical Geography (3 credits)
GEOG 2084: Principles of Geographic Information Systems (3 credits)
GEOG 2314: Maps and Mapping (3 credits)

Required Field Experience
Students select one of the following:
GEOG 3954: Study Abroad (3 credits)
GEOG 4964: Field Study (3 credits)
GEOG 4994: Undergraduate Research (3 credits)

Bachelor Arts (B.A.) Required Coursework

Pathways General Education Requirements: 42-45 credit hours
Concept 1: Discourse (9 credits)
ENGL 1105: First-Year Writing (3 credits)
Or COMM 1015: Communication Skills (3 credits)
ENGL 1106: First-Year Writing (3 credits)
Or COMM 1016: Communication Skills (3 credits)
Additional Discourse Course (3 credits)
Concept 2: Critical Thinking in the Humanities (6 credits)
Concept 3: Reasoning in the Social Sciences (6 credits)
Concept 4: Reasoning in the Natural Sciences (6 credits)
Concept 5: Quantitative and Computational Thinking (9 credits)
STAT 3604: Statistics for Social Science (3 credits)
Or STAT 3615: Biological Statistics (3 credits)
Students select two of the following:
CS 1014: Introduction to Computational Thinking (3 credits)
MATH 1014: Precalculus with Transcendental Functions (3 credits)
MATH 1025: Elementary Calculus (3 credits)
MATH 1026: Elementary Calculus (3 credits)
MATH 1225: Calculus of a Single Variable (4 credits)
MATH 1226: Calculus of a Single Variable (4 credits)
Concept 6: Critique and Practice in Design and the Arts (6 credits)
GEOG 3314: Cartography (3 credits) Students must take GEOG 3314.
Additional Critique and Practice in Design and the Arts Course (3 credits)
Concept 7: Critical Analysis of Identity and Equity in the United States (0-3 credits) *(may be met by another core concept course)*

Additional Pathways General Education Courses: 2-4 credit hours
Students are required to take 2 additional credit hours in Pathways General Education concept area 4.
Concept 4: Critical Thinking in the Natural Sciences (2 additional credits)
Reasoning in the Natural Sciences Laboratory Courses (2 credits)

Students may choose to take 2 additional credit hours in Pathways General Education concept area 5.
Concept 5: Quantitative and Computational Thinking (0-2 credits)

Required Major Coursework: 4 credit hours
The GEOG 3314 required course will be double-counted as part of the Pathways General Education requirements.
GEOG 1024: Survey of Geography (1 credit)
GEOG 3314: Cartography (3 credits)

Cognate Coursework: 3 credits
Students select one course from a list of courses.

FREC 2114: Ecology of Appalachian Forests (3 credits)
FREC 2124: Forests, Society & Climate (3 credits)
FREC/HORT 2134: Plants and Greenspaces in Urban Communities (3 credits)
FREC/NR/LAR 2554: Leadership for Global Sustainability (3 credits)
FREC 3044: Environmental Data Science (3 credits)
FREC/PSCI/IS 4174: Climate Change and the International Policy Framework (3 credits)
GEOS 1034: Earth's Natural Hazards (3 credits)
GEOS 3014: Environmental Geosciences (3 credits)
GEOS 3034: Oceanography (3 credits)
SBIO/FREC 2784: Global Forest Sustainability (3 credits)
SBIO 3004: Sustainable Nature-Based Enterprises (3 credits)
SBIO 3324: Green Building Systems (3 credits)
SOC 1014: Introduction to Social Anthropology (3 credits)
SOC/HIST/STS 2604: Introduction to Data in Social Context (3 credits)
SOC 3204: Social Research Methods (3 credits)
STAT 3616: Biological Statistics (3 credits)

Restricted Electives: 18 credit hours
Students select 18 credits from a list of courses. 12 credit hours must be at the 3000/4000 level.

GEOG/NR 1115: Seeking Sustainability (3 credits)
GEOG/NR 1116: Seeking Sustainability (3 credits)
GEOG 1514: Introduction to Meteorology (3 credits)
GEOG 1524: Introduction to Earths Climate (3 credits)
GEOG/WATR 2004: Water, Environment, and Society (3 credits)
GEOG 2014: Health and Place: Introduction to Health Geography (3 credits)
GEOG 2034: Geography of Global Conflict (3 credits)
GEOG/PSCI/IS 2054: Introduction to World Politics (3 credits)
GEOG/PSCI/IS 2064: The Global Economy and World Politics (3 credits)
GEOG 2104: Introduction to Environmental Security (3 credits)
GEOG 2114: Introduction to Coastal Regions (3 credits)

GEOG 2244: Sustainable Urbanization (3 credits)
GEOG 2505: Weather Analysis I (3 credits)
GEOG 2784: Geography of Tea (3 credits)
GEOG 3034: The CIA: Its Capabilities in Todays Geo-Political World (3 credits)
GEOG 3104: Environmental Justice, Resources and Development (3 credits)
GEOG 3224: Geography of Appalachia (3 credits)
GEOG 3234: Geography of Virginia (3 credits)
GEOG 3244: The U.S. City (3 credits)
GEOG 3254: Geography of East Asia (3 credits)
GEOG 3274: Polar Environments (3 credits)
GEOG/CSES/GEOS 3304: Geomorphology (3 credits)
GEOG 3404: Mountain Geography (3 credits)
GEOG/AHRM/APS/HUM/SOC/UAP 3464: Appalachian Communities (3 credits)
GEOG 4044: Biogeography (3 credits)
GEOG 4054: Geography of Wine (3 credits)
GEOG 4074: Medical Geography of Infectious Diseases (3 credits)
GEOG/GEOS 4084: Modeling with Geographic Information Systems (3 credits)
GEOG/GEOS 4134: Interdisciplinary Issues and Ethics in Water Resources (3 credits)
GEOG 4164: Qualitative Methods & Ethics in Geography (3 credits)
GEOG 4184: Health Applications of Geospatial Techniques (3 credits)
GEOG 4204: Geography of Resources (3 credits)
GEOG/UAP/WGS 4214: Gender, Environment, and International Development (3 credits)
GEOG 4224: Tracking Environmental Change (3 credits)
GEOG 4304: Geospatial Analysis of Mobility (3 credits)
GEOG/GEOS 4354: Introduction to Remote Sensing (3 credits)
GEOG 4414: Climate Change and Societal Impacts (3 credits)
GEOG 4764: International Development Policy and Planning (3 credits)

Free Elective Courses: 25-27 credit hours

Bachelor Science (B.S.) Required Coursework

Pathways General Education Requirements: 42-45 credit hours
Concept 1: Discourse (9 credits)
- ENGL 1105: First-Year Writing (3 credits)
  - Or COMM 1015: Communication Skills (3 credits)
- ENGL 1106: First-Year Writing (3 credits)
  - Or COMM 1016: Communication Skills (3 credits)
- COMM 2004: Public Speaking (3 credits)
  - Or ENGL 3764: Technical Writing (3 credits)
  - Or ENGL 3844: Writing and Digital Media (3 credits)
  - Or HIST 2624: Topics in the History of Data in Social Context (3 credits)

Concept 2: Critical Thinking in the Humanities (6 credits)
Concept 3: Reasoning in the Social Sciences (6 credits)

Concept 4: Reasoning in the Natural Sciences (6 credits)
Concept 5: Quantitative and Computational Thinking (9 credits)
MATH 1014: Precalculus with Transcendental Functions (3 credits) Students must take MATH 1014.
STAT 2004: Introductory Statistics (3 credits)
Or STS 2604: Introduction to Data in Social Context (3 credits)
STAT 3604: Statistics for Social Science (3 credits)
Or STAT 3615: Biological Statistics (3 credits)
Concept 6: Critique and Practice in Design and the Arts (6 credits)
GEOG 3314: Cartography (3 credits) Students must take GEOG 3314.
Additional Critique and Practice in Design and the Arts Course (3 credits)
Concept 7: Critical Analysis of Identity and Equity in the United States (0-3 credits) *(may be met by another core concept course)*

Required Major Coursework: 4 credit hours
The GEOG 3314 required course will be double-counted as part of the Pathways General Education requirements.
GEOG 1024: Survey of Geography (1 credit)
GEOG 3314: Cartography (3 credits)

Required Geographic Information Science and Technology Option Coursework: 16 credit hours
CS 1064: Introduction to Programming in Python (3 credits)
GEOG/GEOS 4084: Modeling with Geographic Information Systems (3 credits)
GEOG 4314: Spatial Analysis in Geographic Information Systems (3 credits)
GEOG 4324: Algorithms in Geographic Information Systems (4 credits)
GEOG/GEOS 4354: Introduction to Remote Sensing (3 credits)

Restricted Electives: 18 credit hours
Geospatial Electives
Students select 9-12 credits from the list of courses.

FREC 4214: Forest Photogrammetry and Spatial Data Processing (3 credits)
GEOG 4304: Geospatial Analysis of Mobility (3 credits)
GEOG 4334: Geospatial Information Technology for Land Change Modeling (3 credits)
GEOG 4254: R Programming for Geospatial Applications (3 credits)
GEOG 4374: Remote Sensing and Phenology (3 credits)
GEOG 4394: Introduction to Web Mapping (3 credits)
GEOG 4404: Geovisualization (3 credits)

Geography
Students select 6-9 credits from the list of courses.

GEOG 1524: Introduction to Earth's Climate (3 credits)

GEOG 2004: Water, Environment, and Society (3 credits)
GEOG 2014: Health and Place: Introduction to Health Geography (3 credits)
GEOG 2034: Geography of Global Conflict (3 credits)
GEOG 2054: Introduction to World Politics (3 credits)
GEOG/PSCI/IS 2064: The Global Economy and World Politics (3 credits)
GEOG 2074: COVID-19: Global Pandemic, Local Impacts (3 credits)
GEOG 2104: Introduction to Environmental Security (3 credits)
GEOG 2114: Introduction to Coastal Regions (3 credits)
GEOG 2134: Geography of the Global Economy (3 credits)
GEOG 2214: Geography of North America (3 credits)
GEOG 2224: Geography of Europe (3 credits)
GEOG 2244: Sustainable Urbanization (3 credits)
GEOG 2505: Weather Analysis I (3 credits)
GEOG 2784: Geography of Tea (3 credits)
GEOG 3034: The CIA: Its Capabilities in Today's Geo-Political World (3 credits)
GEOG 3104: Environmental Problems, Population, and Development (3 credits)
GEOG 3214: Africa Together (3 credits)
GEOG 3224: Geography of Appalachia (3 credits)
GEOG 3234: Geography of Virginia (3 credits)
GEOG 3244: The U.S. City (3 credits)
GEOG 3254: Geography of East Asia (3 credits)
GEOG 3274: Polar Environments (3 credits)
GEOG 3304: Geomorphology (3 credits)
GEOG 3404: Mountain Geography (3 credits)
GEOG/AHRM/APS/HD/HUM/SOC/UAP 3464: Appalachian Communities (3 credits)
GEOG 3504: Severe Weather (3 credits)
GEOG 4044: Biogeography (3 credits)
GEOG 4054: Geography of Wine (3 credits)
GEOG 4074: Medical Geography of Infectious Diseases (3 credits)
GEOG 4134: Interdisciplinary Issues and Ethics in Water Resources (3 credits)
GEOG 4204: Geography of Resources (3 credits)
GEOG 4214: Gender, Environment, and International Development (3 credits)
GEOG 4224: Tracking Environmental Change (3 credits)
GEOG 4284: Human Dimensions of Coastal Social-Ecological Systems (3 credits)
GEOG 4414: Climate Change and Societal Impacts (3 credits)
GEOG 4764: International Development Policy and Planning (3 credits)

Free Elective Courses: 19-22 credit hours

Total Credit Hours: 120 credit hours

The degree program will double-count courses across the curriculum requirements to ensure students complete the 120 credit hours of coursework required for the degree program.

Field Experience

Study Abroad
The study abroad course present students with the opportunity to put knowledge and skills into practice in a real-world context. Students are required to engage in a minimum of 150 hours during the study abroad course. Students work with a faculty advisor to select the study abroad course that best aligns with their career interests and future goals. All students must receive prior approval from the faculty advisor and the Global Education Office before the start date of the course.

Students will work with a faculty advisor to select one of the approved study abroad courses. The study abroad courses can range in length from 10 days to a full academic semester. Costs to students can range from approximately $11,000 - $16,000. Students have the opportunity to apply for scholarship funds to support study abroad costs.

Students will be graded based on participation in the course assignments, midterm and final evaluations, and contact hours verified by the instructor. The students produce written and oral reports in the form of journal entries, reflections, reports and papers, discussions, and oral presentations based on the course requirements that includes fundamental knowledge about human-environment interaction, sense of space, physical landscape determination, spatial data analysis, and field or geospatial research methods. The faculty of record for the course creates a rubric for student assessment and is responsible for evaluating student learning and assigning a final grade. If a student does not pass the study abroad course, the student is offered the opportunity to select the field study or the undergraduate research course to fulfill the field experience requirement. If the student is unable to pass the field experience course, the student may retake the course up to three (3) times. If a student is unable to pass the field experience course, the student is offered the opportunity to transfer to another degree program within the university.

Field Study
The field study course present students with the opportunity to put knowledge and skills into practice in a real-world context. Students are required to engage in a minimum of 150 hours of supervised work though an external internship. Students work with a faculty advisor to select the field study that best aligns with their career interests and future goals. All students must receive prior approval from the faculty advisor before the start date of the course.

Students will be graded based on participation in the course assignments, midterm and final evaluations, and contact hours verified by the instructor. The students produce written and oral reports in the form of journal entries, reflections, reports and papers, discussions, and oral presentations based on the course requirements that includes fundamental knowledge about human-environment interaction, sense of space, physical landscape determination, spatial data analysis, and field or geospatial research methods. The faculty of record for the course creates a rubric for student assessment and is responsible for evaluating student learning and assigning a final grade. If a student does not pass the field study course, the student may retake the course up

to three (3) times. If a student is unable to pass the field experience course, the student is offered the opportunity to transfer to another degree program within the university.

Undergraduate Research
The undergraduate research course present students with the opportunity to put knowledge and skills into practice in a real-world context. Students are required to engage in a minimum of 150 hours of supervised work though a research experience with a faculty member. Students work with a faculty advisor to select the undergraduate research experience and faculty supervisor that best aligns with their career interests and future goals. All students must receive prior approval from the faculty advisor and the faculty supervisor before the start date of the course.

Students will be graded based on participation in the course assignments, midterm and final evaluations, and contact hours verified by the faculty supervisor who is also the faculty of record. The students produce written and oral reports in the form of journal entries, reflections, reports and papers, discussions, and oral presentations based on the course requirements that includes fundamental knowledge about human-environment interaction, sense of space, physical landscape determination, spatial data analysis, and field or geospatial research methods. The faculty of record for the course creates a rubric for student assessment and is responsible for evaluating student learning and assigning a final grade. If a student does not pass the undergraduate research course, the student may retake the course up to three (3) times. If a student is unable to pass the undergraduate research course, the student is offered the opportunity to transfer to another degree program within the university.

Faculty Resources

Faculty in the Department of Geography will teach core and required courses in the proposed B.A/B.S. in Geography degree program. Twelve (12) faculty will teach core and required courses. All faculty members possess a doctorate degree in geography or a physical science. The faculty have been teaching for a minimum of five years in higher education. The faculty are published and conducting research in geography or a physical science.

No adjunct faculty will be needed to initiate and sustain the proposed B.A/B.S. in Geography degree program.

Student Learning Assessment

Student learning for the proposed B.A./B.S. degree program in Geography will be assessed throughout the program through a variety of assessment measures, formative and summative. Some of these measures will include, but are not limited to, assignments, examinations and individual and team-based projects assigned during classroom instruction.

All students will be required to complete at least one semester of experiential learning in a study abroad, field study, or undergraduate research course. The Department of Geography has developed a rubric that the faculty will use to assess students' abilities to apply geographical

knowledge and skills while conducting research, field study, or study abroad projects through deliverables including reports, reflections, and oral presentations. At the end of each semester, the faculty members will use the rubric to score students on their abilities.

Student Learning Outcomes
All students will be able to:

- Interpret the arrangement of major physical and human geographic features on a world map or regional maps.
- Describe the Earth's human and physical characteristics and processes and human-environment interactions.
- Identify the various geospatial tools used in geographical analysis including Geographic Information Systems (GIS), remote sensing, GPS, geovisualization, spatial data coding, and spatial analysis.
- Evaluate the concept of "region" and its importance in understanding world affairs.
- Demonstrate the appropriate use of map projections.
- Name and discuss the techniques, terms and applications of GIS in an informed way.
- Operate contemporary geospatial software in an effective manner.
- Compare and contrast alternative data models used for spatial data representation.
- Apply specialized geographic knowledge in a real-world context.

Curriculum map for B.A./B.S. degree in Geography

Learning Outcomes	**Core and Required Courses**	**Assessment Measures**
Interpret the arrangement of major physical and human geographic features on a world map or regional maps.	GEOG 1014: World Regions GEOG 1104: Introduction Physical Geography	Formative: Class assignments (for example, diagram the atmospheric pressure zones association with the South Asian monsoon) Summative: Course exams (for example, exam question to discuss the spatial organization of population density patterns in China)
Describe the Earth's human and physical characteristics and processes and human-environment interactions.	GEOG 1004: Introduction to Human Geography GEOG 1104: Introduction to Physical Geography	Formative: Class assignments (for example, describe characteristics of climate types in the Köppen classification system)

		Summative: Course exams (for example, exam question to diagram and describe the Urban Heat Island effect)
Identify the various geospatial tools used in geographical analysis including GIS, remote sensing, GPS, geovisualization, spatial data coding, and spatial analysis.	GEOG 1084/FREC 1004: Digital Planet	Formative: Class assignments (for example, identify examples found on the web that use Google Map Application Program Interface (API) to display spatial data patterns) Summative: Course exams (for example, exam question listing three geospatial software/tools that are commonly used to visualize spatial data)
Evaluate the concept of "region" and its importance in understanding world affairs.	GEOG 1004: Introduction to Human Geography GEOG 1014: World Regions	Formative: Class assignments (for example, in class assignment to define and provide an example of a vernacular region from a non-US country) Summative: Course exams (for example, exam question to compare and contrast the explanatory utility of the concentric zone versus multiple nuclei models of US metropolitan urban structure)
Interpret current events in terms of the geographical and historical context.	GEOG 1004: Introduction to Human Geography GEOG 1014: World Regions	Formative: Class assignments (for example, in class discussion to define and provide an example of a stateless nation) Summative: Course exams (for example, exam question related to

		explaining how historical and socio-economic characteristics contribute to Black migration patterns in the 20th century)
Demonstrate the appropriate use of map projections.	GEOG 2084: Principles of Geographic Information Systems GEOG 2314: Maps and Mapping	Formative: Class assignments (for example, homework assignment identifying the type of map projection employed from information on a map) Summative: Lab assignments (for example, assignment to convert data from latitude/longitude to a Cartesian coordinate system designed to preserve the property of equal area measurement)
Name and discuss the techniques, terms and applications of GIS in an informed way.	GEOG 2084: Principles of Geographic Information Systems	Formative: Class assignments (for example, identify the different types of vector overlay methods for points, lines, and polygons and the types of output that are yielded) Summative: Course exams (for example, exam question to discuss how a raster combine function applied to a time series of gridded land cover data can be used to identify and map patterns of land cover change)
Operate contemporary geospatial software in an effective manner.	GEOG 2084: Principles of Geographic Information Systems	Formative: Class assignments (for example, use ArcGIS Pro software to create a vector

		data layer stored in a file geodatabase) Summative: Lab exams (for example, demonstrate use of ArcGIS Pro software to perform spatial data queries using Boolean logic to answer a site suitability question)
Compare and contrast alternative data models used for spatial data representation.	GEOG 2084: Principle of Geographic Information Systems	Formative: Class assignments (for example, homework assignment to define the differing characteristics of vector vs raster spatial data) Summative: Course exams (for example, question to discuss the issues involved in representing human population data using discrete features versus continuous fields)
Apply specialized geographic knowledge in a real-world context.	GEOG 3954: Study Abroad GEOG 4964: Field Study GEOG 4994: Undergraduate Research	Formative: Project assignments (for example, creating digital spatial features of traffic accident locations) Summative: Final report (for example, document and summarizing an analysis of traffic accident patterns)

Employment Skills

All graduates of the proposed B.A./B.S. in Geography degree program will be able to:

- Analyze the distribution of physical geographic features (e.g., land, sea, and air masses), natural resources, and ecosystems across different regions.
- Assess the impact of human population patterns, cultural practices, and economic activities on natural environments.

- Read, analyze and construct maps for a variety of purposes such as assessing population densities near coastlines, helping local governments identify areas at high risk for flooding, mapping police reports over time by location, and mapping tourist traffic flow.

Graduates of the proposed B.A. degree designation in Geography will be able to:

- Analyze how cultural, economic, political, and environmental processes influence spatial patterns, regional development, and interactions between human and natural systems.
- Analyze the distribution of physical geographic features—such as landforms, climates, natural resources, and ecosystems—and their influence on human activity across different regions.
- Compare and contrast world regions by examining the physical and human characteristics that define their geographic identities and interconnections.
- Evaluate the role of geographic scale (local to global) in shaping and understanding social, political, and environmental processes.
- Apply geographic perspectives to contemporary issues such as climate change, urbanization, resource management, and environmental justice using appropriate terminology and conceptual frameworks.
- Read, analyze, and construct maps for applied purposes such as risk assessment, spatial planning, and decision-making related to population density, infrastructure, crime patterns, and tourism.
- Communicate geographic knowledge effectively in written, oral, and visual formats for academic, professional, and public audiences.

Graduates of the proposed B.S. degree designation in Geography will be able to:

- Compile and integrate geographic data from various sources, including field observations, satellite imagery, and existing databases.
- Create and modify maps using GIS software and cartographic principles.
- Evaluate data using geospatial technologies (e.g., remote sensing).
- Develop reports and presentations to communicate complex geographical information to diverse audiences.
- Create ethical guidelines for the use of geospatial technologies and data.

Justification for the Proposed Program

Response to Current Needs (Specific Demand)

Geography is an interdisciplinary field encompassing the interactions between natural environments and human societies, requiring expertise in both broad spatial concepts and technical applications. There is a significant workforce need in Virginia and nationwide for

professionals with advanced geographic knowledge and technical skills, driven by rapid urban growth, environmental challenges, and an increased reliance on geospatial technologies.

The proposed Bachelor of Arts/Bachelor of Science (B.A./B.S.) degree program in Geography will respond to this demand by: 1) addressing the need for foundational knowledge in the field of geography, 2) meeting the need for geography professionals with knowledge and skills in human geography and policy-related fields, and 3) meeting the need for geography professionals with more technical skills in geographical information systems.

Foundational Geographic Knowledge

Geography professionals with strong spatial reasoning and cartographic skills are increasingly vital to informed policymaking and strategic planning. Professionals trained in geographic concepts and spatial visualization techniques are essential for interpreting economic geography, guiding infrastructure investment, planning urban density, and targeting policy interventions effectively. For example, geospatial dashboards can be used to "provide unique insights into a rich array of subnational development indicators which can be leveraged to better understand spatial disparities along various thematic and sectoral dimensions (e.g., poverty, education, health)…[and] inform where development projects should be targeted to most effectively reach areas that hold the greatest potential."[1]

Through coursework emphasizing maps, cartographic interpretation, global regions, and human geography, students will develop skills in spatial reasoning and geographic literacy. These competencies are critical for policy and planning roles, enabling graduates to effectively analyze and communicate complex spatial relationships and policy implications. Nationally, the Geospatial Data Act of 2018 emphasizes the importance of geographic literacy across federal agencies and the importance of geographic understanding across the government to support "informed decision-making and efficient government operations," noting geospatial data supports "economic growth, public health, environmental protection, and other societal benefits."[2] The capacity to visualize and interpret complex spatial relationships is indispensable in addressing societal issues, such as climate change, urbanization, and disaster preparedness.

The proposed B.A./B.S. degree program in Geography core coursework will provide foundational geographic knowledge and training in the field of geography. The proposed B.A. degree designation in Geography will provide knowledge and skills in human geography, cultural studies, urban planning, and policy-related topics such as land use planning (e.g., spatial distribution of agriculture and urban development). The proposed B.S. degree designation in Geography degree designation will provide knowledge and skills in the more technical aspects of the geography field including geographical information science and remote sensing. The

[1] Masaki, T., Bosch, L., Finn, A., Meyer, M., Haider, S. Z., & Bukin, E. (2022, June 2). *Dashboards for development: The power of geospatial data at your fingertips*. World Bank Poverty & Equity Global Practice. https://documents1.worldbank.org/curated/en/099552206032228352/pdf/IDU0918d19120955e04c82096b8073cb389e875a.pdf, p. 1

[2] Government CDO IQ. (n.d.). *Geospatial Data Act of 2018*. https://govcdoiq.org/resources/legislation/geospatial-data-act-of-2018

proposed B.A./B.S. degree program in Geography will prepare graduates to contribute to the need for more geography professionals to address foundational aspects of the field of geography at both the state and national levels.

Differentiated Degree Designation Offerings
Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) degree designations offer different focuses and flexibility in curriculum. B.A. degree designations offer a broad scope of learning in the humanities, arts, and social sciences. Whereas the B.S. degree designations offer a "deeper dive into the technical, analytical, and scientific aspects of a field."[3] Offering both the Bachelor of Arts (B.A.) and the Bachelor of Science (B.S.) degree designations addresses the evolving and diverse nature of geography as a discipline.

The B.A. degree designation in Geography provides a broad foundation in human geography, urban studies, and policy-related fields, preparing graduates for roles in urban planning, and community development. It is more focused on human geography and policy fields. In contrast, the B.S. degree designation in Geography emphasizes the technical, analytical, and scientific dimensions of geographic inquiry, including Geographic Information Systems (GIS), spatial analysis, and remote sensing. It emphasizes more technical GIS and spatial analysis skills than does the B.A. This knowledge and skillset will equip students for technical roles in spatial data management and environmental analysis.

The proposed B.A./B.S. degree program in Geography will address workforce demands for professionals in urban planning, GIS specialists, spatial analysts, and policy experts. The proposed degree program will support state initiatives in infrastructure, sustainability, and disaster management, and will align with national policy priorities (e.g., Geospatial Data Act of 2018).

Demand for Geography Professionals in Human Geography and Policy-Related Fields
The proposed B.A./B.S. degree program in Geography will address growing workforce needs in urban planning, community development, environmental policy, and public administration. According to the Bureau of Labor Statistics (BLS), geographers "inform governments, businesses, and the public on a variety of topics, including urban planning and disaster response."[4] Urban and regional planning areas are expanding due to an increased focus on sustainable development, infrastructure improvement, and efficient land use practices. Demographic shifts and cultural dynamics in urban and rural communities in Virginia further amplify the demand for professionals proficient in analyzing social, economic, and cultural geographies, thereby enhancing community engagement and effective policymaking. "For

[3] Arizona State University. (2025, January 14). *BA vs. BS: The differences between the two degree types*. ASU Online. https://asuonline.asu.edu/newsroom/online-learning-tips/ba-vs-bs-differences/

[4] Bureau of Labor Statistics. (2025, April 18). *Geographers*. In *Occupational Outlook Handbook*. U.S. Department of Labor. https://www.bls.gov/ooh/life-physical-and-social-science/geographers.htm#tab-2

example, geographers' analyses on population distribution and land use are important for infrastructure planning and development by both governments and businesses."[5]

The proposed degree program will prepare students to understand the complex dynamics of human-environment interactions and cultural landscapes. The proposed B.A./B.S. degree program in Geography will prepare graduates to meet the state needs for geography professionals in urban planning and policy development.

Demand for Geographic Information Systems (GIS) Professionals

Demand for professionals skilled in GIS and spatial data analysis is driven by urban planning, environmental sustainability, disaster management, and transportation issues. With the advancements in technologies[6] including digital mapping and visualization, spatial analysis, and big data, and the integration of other disciplines (e.g., computer science), more technically-focused areas have emerged as need in the field of geography (e.g., geographic information systems and remote sensing).

"As geospatial technology rapidly evolves and demand for precise data intensifies, the insights derived from geospatial solutions will become increasingly crucial for decision-making processes across both the private and public sectors."[7] Within Virginia, urbanization trends, especially in rapidly developing regions such as Northern Virginia, Richmond, and Hampton Roads, necessitate GIS expertise to support infrastructure development and environmental resilience. Further highlighting this need, the "Virginia Geographic Information Network (VGIN) and VGIN Advisory Board were established in Code of Virginia (§44-146.18:6 and §2.2-2423) in 1997. VGIN's mission is to encourage and support the innovative implementation of geospatial technologies, applications, and data across commonwealth stakeholder communities. This spans all levels of the public sector (federal, state, regional and local governments), numerous private sector users, academic users at all levels, and citizens of the commonwealth."[8] Additionally, the Virginia Coastal Resilience Master Plan underscores GIS-based analysis to mitigate climate change impacts like flooding, coastal erosion, and severe weather events. For example, the Virginia Institute of Marine Science (VIMS) "maintains a Shoreline Management Model (SMM), a decision support tool which includes a database of shoreline conditions, established as a Geographic Information System (GIS) model

[5] Bureau of Labor Statistics. (2025, April 18). *Geographers*. In *Occupational Outlook Handbook*. U.S. Department of Labor. https://www.bls.gov/ooh/life-physical-and-social-science/geographers.htm#tab-6

[6] American Association of Geographers and Esri. (n.d.). *Geography: The science of our world*. Geography.com. https://www.geography.com/

[7] L.E.K. Consulting. (2024). *Geospatial services: Navigating the next era*. https://www.lek.com/sites/default/files/insights/pdf-attachments/geospatial-services.pdf, p. 18.

[8] Virginia Department of Emergency Management. (n.d.). *Geographic Information Network*. https://www.vaemergency.gov/divisions/911-and-geospatial/geographic-information-network

that helps recommend best management practices for shorelines, using data and decision tree logic to assess potential future conditions."[9]

Coursework in the proposed program will equip graduates with skills in spatial data analysis, digital mapping technologies, and geographic visualization techniques. These courses prepare students to fulfill the growing demand for GIS professionals in Virginia and nationwide. Graduates of the proposed degree program will support these state initiatives, enhancing Virginia's ability to respond proactively to environmental and infrastructural challenges.

Employment Demand

Graduates of the proposed Bachelor of Arts/Bachelor of Science (B.A./B.S.) in Geography degree program will be qualified to collect, interpret, and apply geographic data to analyze the complex relationships between physical landscapes and human activity. Graduates will be prepared to work at the intersection of environment, society, and technology, contributing to planning and policy decisions on urban development, transportation, environmental management, disaster response, and climate resilience. Graduates will be prepared to work in a variety of settings, including government agencies (e.g., U.S. Geological Survey, FEMA, EPA), urban and regional planning offices, environmental consulting firms, tech companies using geospatial analytics, nonprofits focused on sustainability and housing, and academic research institutions.

According to the U.S. Bureau of Labor Statistics (BLS), between 2023 and 2033 employment for geographers will grow at 3% or "about as fast as the average for all occupations."[10] The BLS indicates that "governments and businesses will need geographers to research topics such as natural hazards and the use of resources" and to conduct "analyses on population distribution and land use…for infrastructure planning and development."[11]

According to the U.S. Bureau of Labor Statistics (BLS), between 2023 and 2033 employment for cartographers and photogrammetrists will grow at 6% or "faster than average for all occupations."[12] The BLS indicates that the "use of maps for government planning should lead to employment growth. Cartographers and photogrammetrists also will be needed to map and locate areas that require help during natural disasters, often using Geographic Information Systems (GIS)."[13]

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[9] Virginia Department of Conservation and Recreation. (2020, October). *Virginia Coastal Resilience Master Planning Framework*. Virginia Department of Conservation and Recreation. https://www.dcr.virginia.gov/crmp/document/Virginia-Coastal-Resilience-Master-Planning-Framework-October-2020.pdf, p. 23.

[10] The U.S. Bureau of Labor Statistics. Occupational Outlook Handbook. https://www.bls.gov/ooh/life-physical-and-social-science/geographers.htm#tab-6

[11] Ibid.

[12] The U.S. Bureau of Labor Statistics. Occupational Outlook Handbook. https://www.bls.gov/ooh/architecture-and-engineering/cartographers-and-photogrammetrists.htm#tab-6

[13] Ibid.

The Virginia Employment Commission, Labor Market Information (LMI) shows long term employment projects cartographers and photogrammetrists will grow at a rate of 4.52%.

Virginia Employment Commission, Labor Market Information 2022-2032 (10-Yr)

Occupation[14]	Base Year Employment	Projected Employment	Total Projected Difference	Total Percent Change	Annual Change	Education
Cartographers and Photogrammetrists	818	855	37	4.52%	4	Not available

See Appendix C for employment announcements.

Duplication

Four (4) public institutions offer a similar degree program. The following universities offer undergraduate degree programs in the field of geography: George Mason University, James Madison University, Old Dominion University, and Radford University.

George Mason University
George Mason University (GMU) offers a B.A./B.S. in Geography (CIP: 45.0701) that is similar to the proposed degree program. The purpose of the degree program is to train students on geospatial knowledge, geographical analysis tools, and geoinformation technologies that can help understand human-environment relationships and solve geographical problems. The program requires 120 credit hours. The program requires 24-25 credits of the core coursework. A capstone course is required. GMU's B.A. in Geography degree program has four concentration areas:1) Environmental Geography, 2) Health Geography, 3) Geoanthropology, and 4) Urban Planning. GMU's B.S. in Geography degree program has three concentration areas: 1) Geoinformatics, 2) Geospatial Intelligence, and 3) Urban Science.

Similarities
GMU's program is similar to Virginia Tech's proposed program in that both programs require core coursework in physical geography (Earth's major subsystems, global distribution, interrelationships of climate, vegetation, landforms), spatial aspects of human-environment interaction, spatial data collection analytic tools and methods, geographic analysis using GIS, and geographic research methods and tools.

Differences
The primary difference between GMU's program and the proposed program is that GMU requires cartography in the core coursework. Virginia Tech's proposed program requires cartography in the major coursework. Virginia Tech's proposed program offers the option of a

[14] Virginia Employment Commission. (n.d.). *Labor market information*. https://virginiaworks.com/Occupational-Projections

Study Abroad course in the core coursework, while GMU does not have this option. GMU's B.A. in Geography degree program requires students to select one from the four concentration areas, and its B.S. in Geography degree program requires students to select one from the three concentration areas, while Virginia Tech's proposed degree program does not offer multiple subareas. Virginia Tech's B.A. in Geography has one major, Geography, and the B.S. in Geography has one major, Geography, and one option, Geographic Information Science and Technology**.**

James Madison University
James Madison University (JMU) offers a B.A./B.S. in Geography (CIP: 45.0701) that is similar to the proposed degree program. The purpose of the degree program is to educate students on geospatial technologies and tools to analyze global change and solve problems associated with the spatial patterns and processes of human and environmental change. The program requires 120 credit hours. Based on information in the university's current catalog, the degree program does not have a common core. JMU's B.A./B.S. in Geography degree program has two concentration areas:1) Applied Geographic Information Science, and 2) Environmental Conservation, Sustainability and Development.

Similarities
JMU's program is similar to Virginia Tech's proposed program in that both programs require coursework in physical geography (Earth's major subsystems, global distribution, interrelationships of climate, vegetation, landforms), principles and applications of geographic information systems and spatial aspects of human-environment interaction.

Differences
The primary difference between JMU's program and the proposed program is that JMU does not appear to have a designated set of core courses. Virginia Tech's proposed program has core coursework in physical geography, principles and applications of geographic information systems and spatial aspects of human-environment interaction. These topics are covered in the major coursework in JMU's program. Virginia Tech's proposed program offers the option of a Study Abroad course in the core coursework, while JMU does not have this option. JMU's program requires students to select a concentration. Virginia Tech's proposed degree program does not offer multiple subareas. The B.A. in Geography as one major, Geography, and the B.S. in Geography has one major, Geography, and one option, Geographic Information Science and Technology**.**

Old Dominion University
Old Dominion University offers a B.A./B.S. in Geography (CIP: 30.4401) that is similar to the proposed degree program. The purpose of the degree program is to give students a broad base of geographical training and an understanding of human-environment interrelationships. The degree program requires 120 credit hours. Based on information in the university's current catalog, the degree program does not have a common core. A capstone course is required. ODU's degree program has two majors: 1) Environment and Resources, and 2) Urban Planning & Emergency/Hazards Management.

Similarities
ODU's program is similar to Virginia Tech's proposed program in that both programs require coursework in world regional geography, human geography, maps and geographical information, and digital representation of the Earth and geospatial science and technology.

Differences
The primary difference between ODU's program and the proposed program is that ODU does not appear to have a designated set of core courses. Virginia Tech's proposed program has core coursework in human geography, human and physical patterns and characteristics of world regions, principles and applications of Geographic Information Systems, geographical data analysis, and geospatial technologies and their impact on human-environmental relationships. These topics are not required for all students in ODU's program. Virginia Tech's proposed program offers the option of a Study Abroad course in the core coursework, while ODU does not have this option. ODU's program requires students to select one major among the two majors: 1) Environment and Resources, and 2) Urban Planning & Emergency/Hazards Management. Virginia Tech's proposed degree program does not offer multiple subareas. Virginia Tech's B.A. in Geography has one major, Geography, and the B.S. in Geography has one major, Geography, and one option, Geographic Information Science and Technology**.**

Radford University
Radford University (RU) offers a B.A./B.S. in Geospatial Science (CIP: 45.0702) that is similar to the proposed degree program. The purpose of the degree program is to train students in geographic information systems (GIS), geospatial intelligence (GEOINT), remote sensing, digital/web cartography, environmental sciences, geography to prepare for geoinformatics, environmental and management careers. The program requires 120 credit hours. The program requires 31 credits of the core coursework. A capstone course is required. RU's B.A. /B.S. in Geospatial Science has two concentration areas:1) the Environmental Studies, 2) GIS, Remote Sensing and Data Analytics Concentration.

Similarities
RU's program is similar to Virginia Tech's proposed degree program in that both programs require core coursework in human geography, maps, the physical geography of the Earth, the concepts and applications of Geographic Information Systems (GIS), and methods of geographic data analysis.

Differences
The primary difference between RU's program and the proposed degree program is that the core coursework requires different content. RU's program requires introduction to statistics and fundamentals of cartography in the core coursework while Virginia Tech's proposed program does not require the same content in the core coursework but requires the same content in the General Education (Pathways) coursework and major course work. Virginia Tech's proposed

program also requires the topic of human and physical patterns and characteristics of major world regions including political systems, religions, economies, and physical settings in the core coursework, while RU's program does not require this topic in the core coursework. Virginia Tech's proposed program offers the option of a Study Abroad course in the core coursework, while RU does not have this option. RU's program requires students to select a concentration. Virginia Tech's proposed degree program does not offer multiple subareas. Virginia Tech's B.A. in Geography has one major, Geography, and the B.S. in Geography has one major, Geography, and one option, Geographic Information Science and Technology**.**

Enrollment and Degrees Awarded of Comparable Programs in Virginia

Enrollments[15]	**Fall 2020**	**Fall 2021**	**Fall 2022**	**Fall 2023**	**Fall 2024**
George Mason University	78	71	63	67	72
James Madison University	205	183	184	172	172
Old Dominion University	33	35	52	36	51
Radford University	33	31	31	36	43
Degrees Awarded[16]	**2020**	**2021**	**2022**	**2023**	**2024**
George Mason University	21	20	21	20	12
James Madison University	59	63	65	61	52
Old Dominion University	18	5	13	13	14
Radford University	12	8	8	11	2

Student Demand

Evidence of student demand comes from one source: student enrollment in Geography major.

Fall Enrollment in major, 2020 to 2024

	2020	2021	2022	2023	2024
Fall Enrollment	79	84	88	109	106

[15] State Council of Higher Education for Virginia (SCHEV). *Enrollment summary by program level*. https://research.schev.edu//enrollment/E01_Report.asp

[16] State Council of Higher Education for Virginia (SCHEV). *Completions, Program Detail*. https://research.schev.edu//Completions/C1Level2_Report.asp

State Council of Higher Education for Virginia
Summary of Projected Enrollments in Proposed Program

Year 1		Year 2		Year 3		Year 4 **Target Year (2-year institutions)**			Year 5 **Target Year (4-year institutions)**		
2025 - 2026		2026 - 2027		2027 - 2028		2028 - 2029			2029 - 2030		
HDCT 100	FTES 100	HDCT 100	FTES 100	HDCT 100	FTES 100	HDCT 100	FTES 100	GRAD _____	HDCT 100	FTES 100	GRAD 35

Assumptions:
Retention rate: 90%
Full-time students: 100% Part-time students: 0%
Full-time students credit hours per semester: 15-16
Part-time students credit hours per semester:
Full-time students graduate in 4 years
Part-time students graduate in years

Is summer required? Yes No X

Projected Resource Needs for the Proposed Program

Resource Needs

Virginia Tech and the Department of Geography have all of the faculty, classified support, equipment, space, and other resources necessary to initiate and sustain the proposed B.A. / B.S. degree program in Geography. The proposed program allocates 1.0 FTE of instructional effort for every 24.0 FTE of enrollment in lower division courses and 1.0 FTE of instructional effort for 18.0 FTE of enrollment in upper division courses. The proposed program will therefore require a total of 4.76 FTE of instructional effort in 2025-2026, which will remain constant through the target year 2029-2030.

Full-time Faculty
Six (6) faculty members will teach in the proposed degree program. One (1) faculty member will dedicate 100% (1 FTE) of their teaching time to the proposed degree program. Five (5) faculty members will dedicate 50% (0.50 FTE) each, for a total of 2.5 FTE of their teaching time to the proposed degree program. The program will require 3.5 FTE of faculty instruction to initiate, and this level of effort is expected to remain constant through the target year of 2029-2030.

Part-time Faculty

Six (6) faculty in the Department of Geography will dedicate 25% (0.25 FTE) each, for a total of 1.5 FTE of their teaching time to the proposed degree. The program will require 1.5 FTE of faculty instruction to initiate, and this level of effort is expected to remain constant through the target year of 2029-2030.

Adjunct Faculty
No adjunct faculty will be required to initiate or sustain the proposed degree program.

Graduate Assistants
No new graduate assistantships will be needed to initiate and sustain the proposed the proposed degree program.

Classified Positions
An administrative assistant currently employed by the Department of Geography will support the proposed degree program. The program will require .10 FTE of classified support to initiate, and this level of effort will remain constant through the target year 2029-30. The position answers students questions and assists in scheduling student appointments with faculty. Salary for the administrative assistant will be $6,420 and fringe benefits $2,973, for a total of $9,393.

Equipment (including computers)
No new equipment, including computers, is needed to initiate and sustain the proposed degree program. The equipment available, including computers, is sufficient for the proposed degree program.

Library
No new resources are needed to initiate or sustain the proposed degree program. The library has an adequate collection to support the proposed program. Resources include journals and publications for Geography. As a member of the Virtual Library of Virginia (VIVA), on-line access to journals in also available for the proposed degree program.

Telecommunications
No new or additional resources are required to initiate or sustain the proposed degree program.

Space
No additional space is needed to initiate or sustain the proposed degree program.

Targeted Financial Aid
No targeted financial aid will be offered to initiate and sustain the proposed degree program.

Special Tuition or fee charges
No special tuition or fee charges will be utilized or instituted to initiate or sustain the proposed degree program.

Other Resources (specify)

No additional resources are needed to initiate or sustain the proposed degree program. No resources are needed for advertising and promotion of the proposed degree program.

Funds to Initiate and Operate the Degree Program

Figures provided in the table below will be compared to SCHEV funding estimates using the current base adequacy model. This comparison will serve as a reference for the estimated costs. If there are large discrepancies, SCHEV may request additional clarification to ensure the institution's assumptions are correct, or require modifications as a condition of approval.

Note: Institutions must use the recommended student-faculty ratio when estimating FTES enrollments and required faculty FTEs.

Cost and Funding Sources to Initiate and Operate the Program			
Informational Category		**Program Initiation Year**	**Program Target Year**
		20 25 - 20 26	**20 29 - 20 30**
1.	Projected Enrollment (Headcount)	100	100
2.	Projected Enrollment (FTES)	100	100
3.	Projected Enrollment Headcount of In-State Students	85	85
4.	Projected Enrollment Headcount of Out-of-State Students	15	15
5.	Estimated Annual Tuition and E&G Fees for In-State Students in the Proposed Program	$13,656	$13,656
6.	**Revenue** from Tuition and E&G Fees for In-State Students Due to the Proposed Program	$1,160,760	$1,160,760
7.	Estimated Annual Tuition and E&G Fees for Out-of-State Students in the Proposed Program	$36,107	$36,107
8.	**Revenue** from Tuition and E&G Fees for Out-of-State Students Due to the Proposed Program	$541,605	$541,605
9.	**Projected Revenue Total from Tuition and E&G Fees Due to the Proposed Program**	**$1,702,365**	**$1,702,365**
10.	Other Funding Sources Dedicated to the Proposed Program (e.g., grant, business, private sources, university funds)	$0	$0
11.	**Total Funding**	**$1,702,365**	**$1,702,365**

Part V: Certification Statements

3. A request of any kind will be submitted to the General Assembly for funds to initiate and/or maintain the proposed degree program.

   Yes ☐

   No ☒

   If "Yes" is checked, include narrative text to describe: when the request will be made, how much will be requested, what the funds will be used for, and what will be done if the request is not fulfilled.

2. The proposed degree program is included in the institution's most recent six-year plan.

   Yes ☐

   No ☒

   If "No" is checked, include narrative text to explain why the program is being advanced at the present time despite not being included in the six-year plan.

The institution originally submitted this action as a technical change to add the B.S. degree designation to the existing B.A. in Geography degree program. After reviewing the submission, SCHEV staff determined the curriculum for the B.A. degree designation in Geography would need to be reaffirmed with the curriculum for the B.S. degree designation in Geography.

3. The institution's governing board has been provided information regarding duplication (if applicable) and labor market projections as part of its approval action.

   Yes ☒

   No ☐

   If "No" is checked, include narrative text to explain why the governing board has not been provided the information.

The institution's Chief Academic Officer attests to the accuracy of the above statements

Name (Printed)

Signature Date

Appendices

Appendix A: Sample Plan of Study

Full-Time Student

B.A. Sample Plan of Study

Freshman Fall	**Credits**	**Freshman Spring**	**Credits**
GEOG 1004: Introduction to Human Geography	3	GEOG 1014: World Regions	3
GEOG 1104: Introduction to Physical Geography	3	GEOG 1084/FREC 1004: Digital Planet	3
General Education Course: Discourse	3	General Education Course: Discourse	3
General Education Course: Reasoning in the Social Sciences	3	General Education Course: Critical Thinking in the Humanities	3
General Education Course: Quantitative and Computational Thinking	3	General Education Course: Quantitative and Computational Thinking	3
GEOG 1024: Survey of Geography	1		
Total	**16**	**Total**	**15**
Sophomore Fall	**Credits**	**Sophomore Spring**	**Credits**
GEOG 2084: Principles of Geographic Information Systems	3	General Education Course: Critical Thinking in the Humanities	3
GEOG 2314: Maps and Mapping	3	General Education Course: Reasoning in the Natural Sciences	3
General Education Course: Reasoning in the Natural Sciences	3	General Education Course: Critical Analysis of Identity and Equity in the United States	3
General Education Course: Reasoning in the Social Sciences	3	Cognate Elective	3
Restricted Elective	3	Restricted Elective	3
Total	**15**	**Total**	**15**
Junior Fall	**Credits**	**Junior Spring**	**Credits**
GEOG 3314: Cartography	3	General Education Course: Critique and Practice in Design and the Arts	3
General Education Course: Quantitative and Computational Thinking	3	Restricted Elective	3
Additional General Education Course: Reasoning in the Natural Sciences	2	Restricted Elective	3
Restricted Elective	3	Restricted Elective	3
Restricted Elective	3	Free Elective	3
Total	**14**	**Total**	**15**

GEOG 4994: Undergraduate Research	3	Restricted Elective	3
General Education Course: Discourse	3	Free Elective	3
Restricted Elective	3	Free Elective	3
Restricted Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Total	**15**	Free Elective	1
		Total	**16**

Full-Time Students

Credit Hours – Freshman – Fall Term	16
Credit Hours – Freshman – Spring Term	15
Credit Hours – Sophomore – Fall Term	15
Credit Hours – Sophomore – Spring Term	14
Credit Hours – Junior – Fall Term	15
Credit Hours – Junior – Spring Term	15
Credit Hours – Senior – Fall Term	15
Credit Hours – Senior – Spring Term	16
Total Credit Hours	**120**

B.S. Sample Plan of Study

Freshman Fall	**Credits**	**Freshman Spring**	**Credits**
GEOG 1004: Introduction to Human Geography	3	GEOG 1014: World Regions	3
GEOG 1104: Introduction to Physical Geography	3	GEOG 1084/FREC 1004: Digital Planet	3
General Education Course: Discourse	3	General Education Course: Discourse	3
General Education Course: Reasoning in the Social Sciences	3	General Education Course: Critical Thinking in the Humanities	3
MATH 1014: Precalculus with Transcendental Functions	3	General Education Course: Quantitative and Computational Thinking	3
GEOG 1024: Survey of Geography	1		
Total	**16**	**Total**	**15**
Sophomore Fall	**Credits**	**Sophomore Spring**	**Credits**
GEOG 2084: Principles of Geographic Information Systems	3	CS 1064: Introduction to Programming in Python	3
GEOG 2314: Maps and Mapping	3	General Education Course: Critical Thinking in the Humanities	3
GEOG/GEOS 4354: Introduction to Remote Sensing	3	General Education Course: Reasoning in the Natural Sciences	3
General Education Course: Reasoning in the Natural Sciences	3	General Education Course: Critical Analysis of Identity and Equity in the United States	3
General Education Course: Reasoning in the Social Sciences	3	Restricted Elective	3
Total	**15**	**Total**	**15**
Junior Fall	**Credits**	**Junior Spring**	**Credits**
GEOG 3314: Cartography	3	General Education Course: Critique and Practice in Design and the Arts	3
General Education Course: Quantitative and Computational Thinking	3	GEOG 4314: Spatial Analysis in Geographic Information Systems	3
GEOG/GEOS 4084: Modeling with Geographic Information Systems	3	Restricted Elective	3
Restricted Elective	3	Restricted Elective	3
Restricted Elective	3	Free Elective	3
Total	**15**	**Total**	**15**

Senior Fall	Credits	Senior Spring	Credits
GEOG 4994: Undergraduate Research	3	Free Elective	3
General Education Course: Discourse	3	Free Elective	3
GEOG 4324: Algorithms in Geographic Information Science	4	Free Elective	3
Restricted Elective	3	Free Elective	3
Free Elective	3	Free Elective	1
Total	**16**	**Total**	**13**

Full-Time Students

Credit Hours – Freshman – Fall Term	16
Credit Hours – Freshman – Spring Term	15
Credit Hours – Sophomore – Fall Term	15
Credit Hours – Sophomore – Spring Term	15
Credit Hours – Junior – Fall Term	15
Credit Hours – Junior – Spring Term	15
Credit Hours – Senior – Fall Term	16
Credit Hours – Senior – Spring Term	13
Total Credit Hours	**120**

Appendix B: Course Descriptions

B.A./B.S. Core Courses

GEOG/FREC 1004: Introduction to Human Geography (3 credits)
Introduction to geography as a social science. Development of a conceptual framework for studying and evaluating human-environment relationships. Through examination of selected regional and global issues and through exploring basic concepts like regions, place, location, human-environment interaction, movement, and accessibility, students will discover how power is spatially expressed and explore how culture shapes the production of space and vice versa. Students will also discover and describe how ethical issues manifest spatially.

GEOG 1014: World Regions (3 credits)
Human and physical patterns and characteristics of major regions of the world including political systems, religions, economies, and physical settings. Concepts and perspectives of geography as a social science; linkages and interdependence of nations and regions; analysis of media coverage of events or global issues; engagement with current and historical global affairs.

GEOG 1084/FREC 1004: Digital Planet (3 credits)
Exploration of innovative geospatial technologies and their impact on the world around us, including how humans interact with the environment and each other. Roles of location-based services, global positioning systems, geographic information systems, remote sensing, virtual globes and web-based mapping for environmental applications. Skills and techniques for spatial thinking and environmental decision-making. Ethical implications of the use of geospatial technologies, data, and computational approaches.

GEOG 1104: Introduction to Physical Geography (3 credits)
Integrated study of major subsystems of the natural environment: the nature, distribution, and interrelationships of landforms, climate and vegetation.

GEOG 2084: Principles of Geographic Information Systems (3 credits)
Principles and diverse applications of Geographic Information Systems, geographic coordinate systems, Cartesian map projections, spatial data sources, GIS databases, map representations, and illustrated spatial applications of GIS. Requires regular use of computer systems for geographic data analysis.

GEOG 2314: Maps and Mapping (3 credits)
Introduction to maps. Fundamentals of reading, analysis, and interpretation of hard copy and digital maps, as they are required to illuminate spatial problems. Influences of maps on attitudes toward and images of the geographic environment.

GEOG 3954: Study Abroad (1-19 credits)
No course description listed in catalog.

GEOG 4964: Field Study (1-19 credits)
No course description listed in catalog.

GEOG 4994: Undergraduate Research (1-19 credits)
No course description listed in catalog.

B.A./B.S. Major Coursework: 4 credit hours
GEOG 1024: Survey of Geography (1 credit)
Foundations of geography and subdisciplines. Career pathways for geography-interested students in various workforce sectors and sub-disciplinary specialization areas, including physical geography, GIScience, and human geography. Introduction to campus academic and geography-related career resources to enhance the undergraduate experience. Professional goal reflection and development.

GEOG 3314: Cartography (3 credits)
Science and art of cartography including the conceptual framework of the cartographic method. Development of the skills necessary to create maps to be used in the analysis of spatial phenomena. Emphasis on thematic and ethical cartography.

B.A. General Education Pathway Required Courses
GEOG 3314: Cartography (3 credits)
Science and art of cartography including the conceptual framework of the cartographic method. Development of the skills necessary to create maps to be used in the analysis of spatial phenomena. Emphasis on thematic and ethical cartography.

B.S. General Education Pathway Required Courses
GEOG 3314: Cartography (3 credits)
Science and art of cartography including the conceptual framework of the cartographic method. Development of the skills necessary to create maps to be used in the analysis of spatial phenomena. Emphasis on thematic and ethical cartography.

MATH 1014: Precalculus with Transcendental Functions (3 credits)
Precalculus college algebra, basic functions (algebraic, exponential, logarithmic, and trigonometric), conic sections, graphing techniques, basic probability. Usage of mathematical models, analytical calculations, and graphical or numerical representations of data to analyze problems from multiple disciplines that address intercultural and global challenges in areas such as chemistry, environmental science, the life sciences, finance, and statistics. Use of spreadsheet software. Two units of high school algebra and one of plane geometry are required.

B.S. Geographic Information Science and Technology Option Coursework: 16 credit hours
CS 1064: Introduction to Programming in Python (3 credits)
Introduction to programming in Python contextualized with scientific and engineering problems. Computational problem-solving skills and software solutions in addition to Python language fundamentals. The basics of control flow with loops and conditionals, state tracing and manipulation, simple and complex types, organization of code using functional and object-oriented coding strategies, and data processing. Create, interpret, and debug programs. Ethically debate important issues in computing culture.

GEOG/GEOS 4084: Modeling with Geographic Information Systems (3 credits)

Use of automated systems for geographic data collection, digitization, storage, display, modeling and analysis. Basic data flow in GIS modeling applications. Development of proficiency in the use of current GIS software. Senior Standing.

GEOG 4314: Spatial Analysis in Geographic Information Systems (3 credits)
Theory and application of Geographic Information Systems, with special emphasis on analytical operations, database design, cartographic modeling, and raster GIS. Spatial data handling and analysis to facilitate decision-making through the communication of geographically referenced data.

GEOG 4324: Algorithms in Geographic Information Systems (4 credits)
Computational methods in automated mapping and map analysis. Visual Basic programming and algorithm design for spatial display and analysis under both raster and vector data models. Requires regular use of the departmental microcomputer and UNIX workstation laboratory. Prerequisite(s): GEOG 4084 and CS 1064

GEOG/GEOS 4354: Introduction to Remote Sensing (3 credits)
Theory and methods of remote sensing. Practical exercises in interpretation of aerial photography, satellite, radar, and thermal infrared imagery. Digital analysis, image classification, and evaluation. Applications in earth sciences, hydrology, plant sciences, and land use studies.

Appendix C – Employment Demand
Job Announcements