FAIRMONT STATE UNIVERSITY™

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MEMORANDUM

TO: Faculty Senate

FROM: Dr. Susan Ross

DATE: April 7, 2021

SUBJECT: Curriculum Proposal #20-21-05

This proposal outlines a College of Liberal Arts (COLA) Geographic Information Sciences (hereafter GISc) minor, at Fairmont State University. Geospatial fields are among the fastest growing STEM careers. Considered a bridge discipline, GISc adds an applied STEM focus to all majors and potential career advancement. A GISc minor produces graduates who think spatially, are better able to interpret data, and critically apply theory and practice across disciplines. A GISc minor extends university capacity because industry and government expect GISc to be collaborative with scholarships, internships, and funding. Further applied projects often focus on campus initiatives, local community, and alumni.

cc: Richard Stephens
Lori Schoonmaker
Stephanie Gabor
Laura Ransom
Barbara L. MacLennan

PREPARING CURRICULUM PROPOSALS

INSTRUCTIONS

Draft your proposal in accordance with the guidelines below and the format shown on the following pages. Should any item under the several headings not pertain to your proposal, write N/A. **Number the second and subsequent pages of your proposal.**

Supply the preliminary information about the proposal as indicated below:

PROPOSAL NUMBER: Leave this space blank. A number will be assigned to the proposal by the Executive Director of Academic Programs.

SCHOOL: *College of Liberal Arts, Department of Behavioral Science, Geography*

PREPARER/CONTACT PERSON: *Barbara L. MacLennan, Extension*

COPIES OF MEMOS SENT TO AFFECTED DEPARTMENTS: Attach these to the back of your proposal.

LETTERS OF SUPPORT FROM DEANS OF AFFECTED DEPARTMENTS: If the Curriculum Committee requests these letters, attach them to the back of your proposal.

DATE SUBMITTED: 11/13 updated draft proposal

REVISION SUBMISSION DATE: Revision draft in process (3/26/2021 version draft)

IMPLEMENTATION DATE REQUESTED: *Fall 2021 or Spring 2022*

CURRICULUM PROPOSAL (Submit one electronic copy to the Executive Director of Academic Programs by the second Tuesday of the month.)

Proposal Number:	**#20-21-05**
School/Department/Program:	College of Liberal Arts/Behavioral Sciences/Geography
Preparer/Contact Person:	Barbara L. MacLennan
Title of Degree Program	Minor in Geographic Information Science (GISC)
Telephone Extension:	
Date Originally Submitted:	11/13/20; 11/17/20 (v2)
Revision (Indicate date and label it Revision #1, #2, etc.):	Revision #2
Implementation Date Requested:	Fall 2021 or Spring 2022

I. **PROPOSAL ABSTRACT**. Write a brief abstract, not exceeding 100 words, which describes the proposed changes.

This proposal outlines a College of Liberal Arts (COLA) Geographic Information Sciences (hereafter GISc) minor, at Fairmont State University. Geospatial fields are among the fastest growing STEM careers. Considered a bridge discipline, GISc adds an applied STEM focus to all majors and potential career advancement. A GISc minor produces graduates who think spatially, are better able to interpret data, and critically apply theory and practice across disciplines. A GISc minor extends university capacity because industry and government expect GISc to be collaborative with scholarships, internships, and funding. Further applied projects often focus on campus initiatives, local community, and alumni.

II. **DESCRIPTION OF THE PROPOSAL**. Provide a response for each letter, A-G, and for each Roman Numeral II–V. If any section does not apply to your proposal, reply N/A.

A. Deletion of course(s) or credit(s) from program(s) Total hours deleted:
N/A
N/A

B. Addition of course(s) or credit(s) from program(s) Total hours added: **18**

Required Minor Courses (18 Credit Hours)		
Course Prefix & Number	**Course Name**	**Credit Hours**
GEOG 2210	Introduction to Geography (Existing Course)	3
GEOG 2213	History of 21st Century Geography (Proposed New)	3
GEOG 3316	Introduction to Geospatial Methods (Proposed New)	3
GEOG ELECTIVE	GEOGRAPHY ELECTIVE	3
ELECTIVE COURSES	ELECTIVE COURSE	3
GEOG 4490	Geographic Information Science (GISC) Capstone (Proposed New)	3
TOTAL HOURS FOR MINOR		**18**

Required Courses (18 credit hours)

GEOG 2210 Introduction to Geography (3)
GEOG 2213 History of Modern Geography Methods (3)
GEOG 3316 Introduction to Geospatial Methods (3)
GEOG 4490 Geographic Information Science Capstone (3)

ELECTIVE COURSES:

Students should discuss their elective plans with the GISC Committee for approval. Students must meet any prerequisite requirements before taking courses. Fairmont State University courses will be reviewed annually by the GISc Committee to review updates, changes, and additions to the electives that might occur. Due to the applied nature of the field new courses might be suggested that include Geography and geospatial concepts.

Elective Courses chosen below are 3 credit hours and require no prerequisite courses.

Geography Elective Courses (3 credit hours)
Note: (e.g., select one course from the list below)

- GEOG 1199 SPECIAL TOPICS IN GEOGRAPHY (3)
- GEOG 3399 CARTOGRAPHY: MAPS AND DIAGRAMS (3)
- GEOG 3305 ECONOMIC GEOGRAPHY (3)
- GEOG 3315 URBAN GEOGRAPHY (3)
- GEOG 3317 ADVANCED GEOSPATIAL METHODS (3)
- GEOG 3330 GEOGRAPHY OF NORTH AMERICA (3)
- GEOG 3340: GEOGRAPHY OF EUROPE (3)
- GEOG 3350: GEOGRAPHY OF LATIN AMERICA (3)
- GEOG 3360: GEOGRAPHY OF AFRICA (3)
- GEOG 3370: GEOGRAPHY OF ASIA (3)

NOTE: Choose 1 course from a group below

LIBERAL ARTS ELECTIVES
Note: (If applicable)

- CRIM 1100 - Introduction to Criminal Justice (3)
- CRIM 1101 - Police Operations (3)

- CRIM 2202 - Principles of Criminal Law (3)
- CRIM 2206 - Introduction to Corrections (3)
- CRIM 2212 - Deviant Behavior (3)
- CRIM 2250 – Cybercrime (3)
- CRIM 2295 - Ethics in Criminal Justice (3)
- CRIM 3302 - Criminal Justice Spanish (3)
- CRIM 3305 - Changing Roles of Women in Criminal Justice (3)
- CRIM 3306 - Scientific Basics of Fingerprints (3)
- CRIM 3310 - Comparative Criminal Justice (3)
- CRIM 3311 - Juvenile Justice (3)
- CRIM 3325 - Analysis of Security Operations (3)
- CRIM 3370 - Economic Crime (3)
- CRIM 3375 – Victimology (3)
- CRIM 3380 - Mock Trial (3)
- CRIM 3385 - Racial Profiling (3)
- CRIM 3390 - Forensic Psychology (3)
- CHEP 1110 - Nutrition & Health Promotion (3)
- CHEP 4410 - Public Health Policy Seminar (3)
- ENGL 1102 - Written English II (3)
- FOLK 3302 - Regional Cultural Geography and History (3)
- HIST 1107 - United States History I (3)
- HIST 1108 - United States History II (3)
- HIST 2211 - World Civilizations I (3)
- HIST 2212 - World Civilizations II (3)
- HIST 2213 - World Civilizations III (3)
- MUSM 1100 - Introduction to Museums (3)
- MUSM 3301 - Material Culture (3)
- NSIS 3300 - Intelligence Research (3)
- PHIL 1150 - Theories of Human Nature (3)
- POLI 1100 - American Government (3)
- POLI 2200 - Introduction to Political Science (3)
- POLI 2210 - Principles of International Relations (3)
- POLI 2220 - Comparative Government (3)
- POLI 3300 - Public Administration (3)
- POLI 3302 - State and Local Government (3)
- POLI 3311 - Global Affairs (3)
- POLI 3350 - International Law and Organizations (3)
- POLI 3360 - Future Global Crises (3)
- POLI 3370 - World Religions and Politics (3)
- POLI 3385 - Politics in Film and Fiction (3)
- POLI 3390 - Law and the Legal System (3)
- POLI 4405 – Terrorism (3)
- POLI 4415 - International Problems (3)
- POLI 4420 - Supreme Court of the United States (3)
- PSYC 1101 - Introduction to Psychology (3)
- SOCY 1110 - Introductory Sociology (3)
- SOCY 2200 - Social Problems (3)
- SOCY 2205 - Principles of Race, Class, and Gender (3)
- SOCY 3350 - Sociology of Religion (3)

COLLEGE OF SCIENCE & TECHNOLOGY ELECTIVES

- ARCH 2010 - Architectural History I (3)
- ARCH 3010 - Sustainable Design (3)
- ARCH 3085 - Architecture Study + Travel
- ART 1120 - Art Appreciation (3)
- COMP 1100 - Introduction to Computing (3)
- COMP 1110 - Introduction to Programming (3)
- GRFX 1111 - Imaging I Foundations (3)
- GRFX 1113 - Multimedia Concepts
- SCIE 1107 - Geographic Information Systems (4)
- SCIE 1120 - Introduction to Meteorology (4)

C. **Provision for interchangeable use of course(s) with program(s): N/A**

D. **Course Description Revision**: Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog.

E. **Course Changes:** Identify changes to existing courses such as changes to title, course number, learning outcomes, and elective or required status.

F. **Create a New Course**(s) information (if applicable): For each new course complete the following:

New course numbers have not been finalized but are in the process of being determined. Current new course numbers are suggestions.

1. **Course Catalog Information:**

a. Course prefix (subject area) and number:	GEOG 2213 (New Course)
b. Course title:	History of 21st Century Geography (Proposed New)
c. Course term(s) (e.g., Fall, Summer only):	Spring, Summer
d. Credit hours/Variable credit:	3
e. Repeatability (number of repeat credit hours):	
f. **Prerequisite/Corequisites/Restrictions/Cross-listings:** If none, simply indicate with N/A (Not Applicable):	N/A
g. ***Co-requisite*** (include subject prefix and course number):	N/A
h. ***Cross-listings*** (e.g., PSYC 2230 and SOCY 2230):	N/A
i. **Grade Type:** Indicate whether students will be assigned a standard A-F final grade or Credit/No Credit (CR/NCF) grade:	A-F final Grade
j. Required Course or Elective Course:	Required
k. Course Fees (Indicate amount):	

2. **Course Catalog Information:**

a. Course prefix (subject area) and number:	GEOG 3316 (New Course)
b. Course title:	Introduction to Geospatial Methods
c. Course term(s) (e.g., Fall, Summer only):	Fall, Summer
d. Credit hours/Variable credit:	3
e. Repeatability (number of repeat credit hours):	
f. **Prerequisite/Corequisites/Restrictions/Cross-listings:** If none, simply indicate with N/A (Not Applicable):	GEOG 2213
g. ***Co-requisite*** (include subject prefix and course number):	N/A
h. ***Cross-listings*** (e.g., PSYC 2230 and SOCY 2230):	N/A
i. **Grade Type:** Indicate whether students will be assigned a standard A-F final grade or Credit/No Credit (CR/NCF) grade:	A-F Final Grade
j. Required Course or Elective Course:	Required
k. Course Fees (Indicate amount):	

3. **Course Catalog Information:**

a. Course prefix (subject area) and number:	GEOG 3317 (New Course)
b. Course title:	Advanced Geospatial Methods
c. Course term(s) (e.g., Fall, Summer only):	Fall, Summer
d. Credit hours/Variable credit:	3
e. Repeatability (number of repeat credit hours):	
f. **Prerequisite/Corequisites/Restrictions/Cross-listings:** If none, simply indicate with N/A (Not Applicable):	GEOG 2213, GEOG 3316
g. ***Co-requisite*** (include subject prefix and course number):	N/A
h. ***Cross-listings*** (e.g., PSYC 2230 and SOCY 2230):	N/A
i. **Grade Type:** Indicate whether students will be assigned a standard A-F final grade or Credit/No Credit (CR/NCF) grade:	A-F Final Grade
j. Required Course or Elective Course:	Elective
k. Course Fees (Indicate amount):	

4. **Course Catalog Information:**

a. Course prefix (subject area) and number:	GEOG 4490 (New Course)
b. Course title:	GISc Capstone
c. Course term(s) (e.g., Fall, Summer only):	Spring
d. Credit hours/Variable credit:	3
e. Repeatability (number of repeat credit hours):	
f. **Prerequisite/Corequisites/Restrictions/Cross-listings:** If none, simply indicate with N/A (Not Applicable):	GEOG 2210, GEOG 2213,Geog Elective, Elective
g. ***Co-requisite*** (include subject prefix and course number):	N/A
h. ***Cross-listings*** (e.g., PSYC 2230 and SOCY 2230):	N/A
i. **Grade Type:** Indicate whether students will be assigned a standard A-F final grade or Credit/No Credit (CR/NCF) grade:	A-F Final Grade
j. Required Course or Elective Course:	Required
k. Course Fees (Indicate amount):	

2. New Course Supplemental/Supporting Documentation:

a. **Course Catalog Description**: Include, as an appendix, a course catalog description written in complete sentences that will be published in the university catalog. The word length for a catalog description should be less than 80 words. Do not include any prerequisites, corequisites or any other restrictions in the description.

b. **Course Learning Outcomes (CLO's):** These should be stated in terms of what new knowledge and/or skills students should be able to demonstrate upon successful completion of the course. Present course learning outcomes as a bulleted list predicated with "Upon successful completion of this course, students should be able to…"

c. **Course Outline:** Attach a course outline consisting of at least two levels.

d. **Assessments:** Describe generally how student's achievement of the course learning outcomes will be assessed

3. **Shared Course**: If this is a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for course being shared.

G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A.

III. RATIONALE FOR THE PROPOSAL

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

See Appendix C for supporting materials and costs.

It is important to note that the purchase of this new equipment will be necessary to support the proposed Geography minor, but it will also be utilized in other COLA programs such as Criminal Justice courses that employ and examine crime mapping. The equipment and software will also be used in courses within the Community Health program that investigate tracing and quantify public health information.

The scientific approach to Geographic Information (GI), often referred to as geographic information science (GIScience or GISc), is interested in the human geography, social and behavioral science, humanities, journalism, communication, and GEOINT (or geospatial intelligence) such as the social consequences and implications of the use and diffusion of GISc systems and technology, its applications, impact and development and how that shapes the lives and activities of people, and their interactions with places and each other.

According to Dastrup (2019):

> From climatologists trying to understand the causes and consequences of global warming, to epidemiologists locating ground zero of a virulent disease outbreak, to archaeologists reconstructing ancient Rome, to political consultants developing campaign strategies for the next presidential election, GIS is a very powerful tool. More important, GIS is about geography and learning about the world in which we live. As GIS technology develops, as society becomes ever more geospatially enabled, and as more and more people rediscover geography and the power of maps, the future uses and applications of GIS are unlimited.

The Geographic Information Science (GISc) Minor was developed based on the high demand in the state, federal and state agencies, and industry for employees with spatial analysis capabilities in fields related to the Liberal Arts, Social Science, Behavioral Sciences. An assessment of GISc minors at similar institutions in the region was conducted, along with a review of current quantitative professional studies and resources to determine the marketability of a GISc Minor at Fairmont State University. The current proposal is comparable with respected GISc Minors such as Penn State and should

increase marketability for students and returning professionals wanting the competitive advantage an applied minor gives at an affordable cost.

The establishment of a Fairmont State University COLA GISC minor is needed to keep competitive with universities that offer similar programs. What differentiates the GISC minor at Fairmont State University is its campus-wide embedded approach. A GISC minor would be expected by many majors that require students to have a spatial background and makes them more competitive with universities that offer GIS/GISC. The GISC minor would offers undergraduates a GISC capstone and portfolio building related to their specific field. The GISC minor meets the WV state, US Agencies, local government, and NGO goals of theoretical and conceptual knowledge (COLA focus) that many identify as missing in new hires. Moreover, the GISC minor is university wide whereas the other universities tend to have certificates or programs that are specific to one scientific area.

Professional Reports

A review of current professional reports and quantitative surveys on the state of the profession and outlooks for higher education, all state that higher education will be critical to meeting the growing need for a geospatially literate workforce. The reports emphasize that their quantitative data shows that geospatial job growth spans across all fields of study but especially as a bridge for those related to human behavior, population, and public awareness.

- AAG Guide to Geography Programs in the America 2019-2020 http://www.aag.org/guide
- Oak Ridge Institute for Science and Education (2020) What STEM Careers are in High Demand?
    - https://orise.orau.gov/resources/stem/professional-development/finding-an-internship/what-stem-careers-are-in-high-demand.html
- ESRI GIS for Higher Education
    - https://www.esri.com/en-us/industries/education/higher-education
- ArcGIS For High Ed Learners (April 2020)
    - https://storymaps.arcgis.com/stories/66bf3519f3eb4e95b2a272b691f060b6
- Charting a course for GIS Education for 2030 (Kerski, 2020)
    - https://storymaps.arcgis.com/stories/4d638de721c24a269481ccef3173c570

Analysis of Competing Universities in Region (see attached matrix)

Discussion with Government Agencies, Communities and Businesses

a. Companies like Baker Engineering have talked about needing geospatial literate employees that can flexibly adapt to the changing location-based world and demonstrate a capacity to learn and communicate in a geospatial environment.
b. Government Agencies, specifically intelligence agencies, consider geospatial data and location-based data to be a part of the increase in big data.
c. Community and local government development has seen an increase in the need for dedicated geospatial employees that can grow into their position with more training.

WV Department of Education

The West Virginia Department of Education is developing a digital mapping technology certificate for high school students, while also encouraging integration of digital mapping technologies into all content disciplines in elementary, middle, and high schools. The certificate is being developed in concert with the WV State GIS Policy Council

Student Surveys

Pre and post course discussions and reflections with Introduction to Geography students on their expectations for what they want to learn in Geography.

Professional Committees

The future goals of the WV GIS State Committee which says that the WV Legislature is focusing on geospatial skill development in K- Higher Education for West Virginia to create jobs in West Virginia and attract companies.

Conference talks with West Virginia Association of Geospatial Professionals about the need for students that have the ability to learn more about and grow in geospatial jobs in the state and that can interact knowledgeably with the geospatial industry.

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

Fairmont State University already possesses many of the components that create an effective GISc minor environment. Establishing a GISc minor will recruit students, open the door for subsequent funding and collaborations on campus, provide a platform for promoting the teaching and research being carried out at Fairmont State University, and provide a network to Alumni working in geospatial related fields.

According to Joseph Kerski, ESRI Education Manager, “Some students need to know a LOT of GIS. All students need to know some GIS.” because students today are working in a geospatial world across disciplines with statistics, mathematics, coding, visualization & communication tools. Therefore, the increased cost will be in creating a Spatial Lab with facilities and equipment. See attached budget spreadsheet for creation of a Spatial Lab

The dynamic nature of the spatial science profession has been built into the plan for the GISC minor. The GISC minor is designed for one geography faculty member working closely with embedded (existing) faculty throughout campus who are interested in the collaborative potential of GISC. Additionally, the GISC minor was created to provide the foundational knowledge for future growth and specialization that in the future could include new faculty.

IV. APPROVAL

Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature
College of Liberal Arts	**Christopher Kast**	Chris Kast

V. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

VI. ADDITIONAL COMMENTS.

APPENDIX A

Geography – Minor in Geographic Information Science (GISc)
N/A No Current Program

APPENDIX B
New Minor

College/School/Department: ***College of Liberal Arts/School of Behavioral Sciences/Geography***
Minor Title: Geographic Information Science Minor (GISc)

Description:

General information and description of the minor here, including professional opportunities resulting from minor or certificate (if applicable).

Fairmont State University students may specialize in Geographic Information Science (GISc) and spatial analysis by completing a Minor in Geographic Information science. Considered a bridge discipline, the minor offers students in all fields the opportunity to add a competitive big data minor to their current area of study with the addition of geospatial analysis, spatial literacy communication, and cartographic mapping skills to their current area of study. There are no perquisites or advanced technical knowledge needed for this minor, but students should possess a willingness to learn technological skills.

Required Courses (12 credit hours)

- GEOG 2210 Introduction to Geography (3)
- GEOG 2213 History of Modern Geography Methods (3)
- GEOG 3316 Introduction to Geospatial Methods (3)
- GEOG 4490 Geographic Information Science Capstone (3)

Geography Elective Courses (3 credit hours)

- Note: (e.g., select one course from the list below)

- GEOG 1199 SPECIAL TOPICS IN GEOGRAPHY (3)
- GEOG 3399 CARTOGRAPHY: MAPS AND DIAGRAMS (3)
- GEOG 3305 ECONOMIC GEOGRAPHY (3)
- GEOG 3315 URBAN GEOGRAPHY (3)
- GEOG 3317 ADVANCED GEOSPATIAL METHODS (3)
- GEOG 3330 GEOGRAPHY OF NORTH AMERICA (3)
- GEOG 3340: GEOGRAPHY OF EUROPE (3)
- GEOG 3350: GEOGRAPHY OF LATIN AMERICA (3)
- GEOG 3360: GEOGRAPHY OF AFRICA (3)
- GEOG 3370: GEOGRAPHY OF ASIA (3)

NOTE: Choose 1 course from a group below

Liberal Arts Electives

Note: (If applicable)

- CRIM 1100 - Introduction to Criminal Justice (3)
- CRIM 1101 - Police Operations (3)
- CRIM 2202 - Principles of Criminal Law (3)
- CRIM 2206 - Introduction to Corrections (3)
- CRIM 2212 - Deviant Behavior (3)
- CRIM 2250 – Cybercrime (3)
- CRIM 2295 - Ethics in Criminal Justice (3)
- CRIM 3302 - Criminal Justice Spanish (3)
- CRIM 3305 - Changing Roles of Women in Criminal Justice (3)
- CRIM 3306 - Scientific Basics of Fingerprints (3)

- CRIM 3310 - Comparative Criminal Justice (3)
- CRIM 3311 - Juvenile Justice (3)
- CRIM 3325 - Analysis of Security Operations (3)
- CRIM 3370 - Economic Crime (3)
- CRIM 3375 – Victimology (3)
- CRIM 3380 - Mock Trial (3)
- CRIM 3385 - Racial Profiling (3)
- CRIM 3390 - Forensic Psychology (3)
- CHEP 1110 - Nutrition & Health Promotion (3)
- CHEP 4410 - Public Health Policy Seminar (3)
- ENGL 1102 - Written English II (3)
- FOLK 3302 - Regional Cultural Geography and History (3)
- HIST 1107 - United States History I (3)
- HIST 1108 - United States History II (3)
- HIST 2211 - World Civilizations I (3)
- HIST 2212 - World Civilizations II (3)
- HIST 2213 - World Civilizations III (3)
- MUSM 1100 - Introduction to Museums (3)
- MUSM 3301 - Material Culture (3)
- NSIS 3300 - Intelligence Research (3)
- PHIL 1150 - Theories of Human Nature (3)
- POLI 1100 - American Government (3)
- POLI 2200 - Introduction to Political Science (3)
- POLI 2210 - Principles of International Relations (3)
- POLI 2220 - Comparative Government (3)
- POLI 3300 - Public Administration (3)
- POLI 3302 - State and Local Government (3)
- POLI 3311 - Global Affairs (3)
- POLI 3350 - International Law and Organizations (3)
- POLI 3360 - Future Global Crises (3)
- POLI 3370 - World Religions and Politics (3)
- POLI 3385 - Politics in Film and Fiction (3)
- POLI 3390 - Law and the Legal System (3)
- POLI 4405 – Terrorism (3)
- POLI 4415 - International Problems (3)
- POLI 4420 - Supreme Court of the United States (3)
- PSYC 1101 - Introduction to Psychology (3)
- SOCY 1110 - Introductory Sociology (3)
- SOCY 2200 - Social Problems (3)
- SOCY 2205 - Principles of Race, Class, and Gender (3)
- SOCY 3350 - Sociology of Religion (3)

Science and Technology Electives

Note: (e.g. Choose 1 class from a category below)

- ARCH 2010 - Architectural History I (3)
- ARCH 3010 - Sustainable Design (3)
- ARCH 3085 - Architecture Study + Travel
- ART 1120 - Art Appreciation (3)
- COMP 1100 - Introduction to Computing (3)

- COMP 1110 - Introduction to Programming (3)
- GRFX 1111 - Imaging I Foundations (3)
- GRFX 1113 - Multimedia Concepts
- SCIE 1107 - Geographic Information Systems (4)
- SCIE 1120 - Introduction to Meteorology (4)

Total Credit Hours = 18 Credit Hours

EXISTING COURSES:

GEOG 2210 Introduction to Geography .....3 hrs.
An introduction to the physical and cultural elements of geography, with a study of major geographical regions of the world.

EXISTING ELECTIVE GEOGRAPHY COURSES

GEOGRAPHY GEOG 1199 Special Topics in Geography..... 1-12 hrs.
Studies in special selected topics, to be determined by the instructor and approved by the chairperson. Credits earned will be applicable as free electives in degree and certificate programs.

GEOG 3399 Cartography: Maps and Diagrams .....3 hrs.
This course covers statistical data through different kinds of diagrams, such as bar, pie, ring, and block diagrams and graphs; the preparation and understanding of maps and introduction to the application of computers for maps and diagrams.

GEOG 3305 Economic Geography….....3 hrs.
A geographic study of the production, consumption and exchange of goods by people throughout the world. Consideration is also given to spatial variations and influences of the natural environment and culture.

GEOG 3315 Urban Geography ….....3 hrs.
A study of urbanization process, including origin, growth, function, spatial patterns, structure and hierarchical arrangement of urban centers. Students will also examine urban problems, with special references to American cities.

GEOG 3330 Geography of North America ….....3 hrs.
A course in regional economic geography, primarily of the United States and Canada, from the standpoint of humanities activities in relation to their natural surroundings and resources.

GEOG 3340: Geography of Europe ….....3 hrs.
A study of the important geographic concepts concerning man's activities in Europe and their importance to the United States and the rest of the world. A general overview will be made of Soviet European geography.

GEOG 3350: Geography of Latin America.....3 hrs.
This course is a regional study of South America, Central America, Mexico and the West Indies.

GEOG 3360: Geography of Africa.....3 hrs.
A regional survey of the continent, examining the great diversity that characterizes the area. Emphasis is placed on the complexity of its political pattern, natural resources, economic development and physical setting.

GEOG 3370: Geography of Asia.....3 hrs.
The study of Asia for the purpose of understanding the various Asian nations, their economic-geographic regions, major commodities, industry, commerce and major problems.

APPENDIX B
PROPOSED NEW COURSE 1

GEOG 2213 History of 21st Century Geography (Proposed New) (3 credit hrs.) Develop effective spatial literacy, how to communicate spatial information visually, and how recent advances in technology and data availability have increased our knowledge about the world. This class surveys key concepts of geospatial technologies (GISc, remote sensing, spatial analysis) in the context of Human Geography, demography, and behavioral patterns
PR: GEOG 2210.

Detailed Course Outline

- Introduction to Geospatial Technologies (3 weeks)
    - Basic spatial concepts and geographic information science
    - Current uses of geospatial technologies
    - History of geospatial technologies in our lives
    - Development and use of geospatial technologies in their own fields
    - Geospatial Ethics
- Digital Cartography (5 weeks)
    - Datums and Projections
    - Symbology and Cartographic Design
    - Digitizing
    - Citizen Science, Open Source
    - Infographics and communication
- Spatial Analysis (5 weeks)
    - Introduction to Spatial Analysis
    - Spatial Analysis in their own fields
    - Spatial Analysis and critical thinking
- Introduction to Remote Sensing (3 weeks)
    - Remote Sensing concepts
    - Remote sensing technologies (satellites, drones, cell phones…)
    - Remote sensing in their own fields
- The Geospatial Community
    - Career talks
    - Associations and Professional Organizations

Outcome	Direct Assessment	Satisfactory performance standard
recognize how geospatial technologies have changed and continue to change our daily lives	Exam/Homework/Discussion/Project	A class average of 70% or more on associated questions.
describe and compare means to collect geospatial data	Exam/Homework/Discussion/Project	A class average of 70% or more on associated questions.
describe and select appropriate map projections for map production	Exam/Homework/Discussion/Project	A class average of 70% or more on associated questions.
Use appropriate terminology and methods for spatial analysis techniques.	Exam/Homework/ Discussion/Project	A class average of 70% or more on associated questions.

PROPOSED COURSE 2 (New Course)

GEOG 3316 Introduction to Geospatial Methods (3 credit hrs.) This course introduces the foundational concepts of geographic information science (GISc) using Human Geography, demography, and behavioral patterns of advanced topics in GISc and geospatial technology. All topics will be paired with appropriate software. This course has an associated geospatial lab time.
PR: GEOG 2213.

Detailed Course Outline

- Introduction to Geospatial Foundational Concepts and Ethics
- Overview of evolution of Geospatial Field, Technologies, and Platforms
- Introduction to Cartographic Principles and Spatial Communication
- Introduction to Map Making, Spatial Analysis and Spatial Outreach
- Basics of working with Data, Data Classifications, and Management
- Basics of Geoprocessing, Geocoding, Georeferencing and Geoediting

Outcome	**Direct Assessment**	**Satisfactory performance standard**
Understand geospatial foundational concepts, ethics	Exam/Homework/Project	A class average of 70% or more
Explain the evolution of Geospatial Field, Technologies, and Platforms, overall and in their field	Exam/Homework/Project	A class average of 70% or more
Visualize and communicate cartographic principles	Exam/Homework/Project	A class average of 70% or more
Manipulate spatial code, geo processes and classification and make maps at a beginner level	Exam/Homework/Project	A class average of 70% or more
Demonstrate the fundamentals of GIS Data and Project Management	Exam/Homework/Project	A class average of 70% or more

APPENDIX B
PROPOSED NEW COURSE 3

GEOG 3317 Advanced Geospatial Methods 3 hrs. This course is a project-based exploration spatial communication using Human Geography, demography, and behavioral patterns of advanced topics in GISc and geospatial technology. All topics will be paired with appropriate software.
PR: GEOG 3316

Detailed Course Outline

- Introduction to Advanced Methods and Geospatial Technologies (3 weeks)

    - Ontology
    - Overview of advanced methods and current technologies
    - Advanced concepts: Modifiable Aerial Unit Problem, Uncertainty
- Fundamentals of GIS Management
    - GIS Project Management
    - GIS Geodatabase Management
    - Associations and Professional Organizations
- Advanced Spatial Analysis (5 weeks)
    - Explore innovative applications and spatial tools
    - Identify and interpret spatial patterns
    - Analyze spatial relationships and interpret results
- WebGIS and PPGIS (5 weeks)
    - Interactive cartography and WebGIS
    - PPGIS practices, impact, ethics,
    - Spatial Analysis and critical thinking
- Modeling (3 weeks)
    - 3D Visualization
    - LiDAR functions
    - Network Analysis

Outcome	**Direct Assessment**	**Satisfactory performance standard**
Use and evaluate new spatial technologies and tools	Exam/Homework/Project	A class average of 70% or more
Develop research questions and conduct meaningful spatial analysis	Exam/Homework/Project	A class average of 70% or more
Visualize and communicate spatial analysis effectively	Exam/Homework/Project	A class average of 70% or more
Manipulate spatial code at an intermediate level	Exam/Homework/Project	A class average of 70% or more
Demonstrate the fundamentals of GISc and GIS Project Management	Exam/Homework/Project	A class average of 70% or more

APPENDIX B
PROPOSED NEW COURSE 4

GEOG 4490 GISc Capstone (3 credit hrs.)
This course provides an opportunity for students to pursue a research interest in the spatial sciences through the development of an applied project and paper. The capstone walks students through the steps expected for geospatial projects in the workforce through a large-scale project generated either internally or through contacts at the university, local, regional, federal or international scale. In the process, students will apply geospatial planning and management, analysis, ethics, and collaboration to solve a real-world problem or spatial challenge.

Detailed Course Outline

- Project Development (4 weeks)
  - Project idea
  - Project spatial data requirements
  - Project Proposal
- Project Management and Spatial Analysis
  - Project Outline and Diagrams
- Project Visualization and Communication
  - Spatial Visualizations
- Project Evaluation
  - Presenting Project

Outcome	**Direct Assessment**	**Satisfactory performance standard**
Effectively manipulate and organize real-world spatial data	Project/Paper/Presentation	A class average of 70% or more
Use spatial data concepts and tools to analyze a real-world problem	Project/Paper/Presentation	A class average of 70% or more
Visualize and communicate the results of real-world spatial analysis effectively	Project/Paper/Presentation	A class average of 70% or more

APPENDIX C

Resources: Support for GISc in Higher Education

Geospatial Science has a built-in supportive community starting with Fairmont State University Alumni who work in the geospatial field, to WV industry, associations, and state government, to broader support in the federal government and industry. Below is a selection from the GIS community.

Associations that provide support for GIS in Higher Education

- URISA-WV, The Urban and Regional Information Systems Association
- ESRI Higher Education
- American Association of Geographers
- NCGE, The National Council for Geographic Education
- USGIF, The United States Geospatial Intelligence Foundation
- University of Redlands https://www.redlands.edu/study/schools-and-centers/college-of-arts-and-sciences/geographic-information-systems/pathway/

State

- West Virginia State GIS Office
- West Virginia Association of Geospatial Professionals
- West Virginia Homeland Security
- West Virginia University Aaron Maxwell (Digital Earth, Open Source)
- West Virginia GIS Technical Center (WVGISTC)
- West Virginia Geospatial Education Committee
- West Virginia Department of Transportation
- WV Department of Education

Federal

- USGS, The United States Geological Survey
- US Census, United States Census Office
- FGDC, Federal Geographic Data Committee
- NIH, National Institutes of Health
- USDOC, United States Department of Commerce
- NOAA, The National Oceanic and Atmospheric Administration
- The National Aeronautics and Space Administration USDA
- NGA, The National Geospatial-Intelligence Agency
- FEMA, The Federal Emergency Management Agency
- NSF Geospatial, The National Science Foundation
- CDC/NIOSH, United States Center for Disease Control

Private

- ESRI
- Thrasher
- OpenMap
- QGIS
- Blue Marble

APPENDIX C

References: Support for GIS in Higher Education

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COPIES OF MEMOS SENT TO AFFECTED DEPARTMENTS:
Will request if needed.

LETTERS OF SUPPORT FROM DEANS OF AFFECTED DEPARTMENTS:
Will request if needed

APPENDIX C

Geospatial Lab Cost

GEOSPATIAL LAB REQUIREMENTS						
Software						
	Software Name	Cost Estimate/Contract	Budget 1 Tentative	Budget 2 Tentative	Budget 3 Tentative	Description
Adobe	Illustrator	Existing FSU Contract	$0	$0	$0	
Adobe	Photoshop	Existing FSU Contract	$0	$0	$0	
ArcGIS						
ArcGIS Academic Licensing Bundles	Medium Academic Tier (up to 50 users)	$500/ year	$500			ArcGIS Online, ArcGIS Enterprise, ArcGIS Pro and Extensions, CityEngine, ArcPad includes technical support, software updates,
	Large Academic Tier (up to 100 users)	1,000/ year		$1,000	$1,000	ArcGIS Online, ArcGIS Enterprise, ArcGIS Pro and Extensions, CityEngine, ArcPad includes technical support, software updates,
Digital Mapper (Blue Marble)						
ERDAS						
Microsoft	Excel	Existing FSU Contract	$0	$0	$0	
GIT						
Google Earth		Open Source	$0	$0	$0	
JMP						
Leaflet						
OpenGeoDa		Open Source	$0	$0	$0	
Python 3 (spyder - Anaconda)						
QGIS		Open Source	$0	$0	$0	
QuickTime						
SketchUp	SketchUp Studio 3D	$55/yr	$55	$55	$55	
Skype						
STATA						
STEAM Subscription						
StoryMapJS (Knight Media)		Open Source	$0	$0	$0	
LAB EQUIPMENT						
Instructor Machine						
Dell Precision Workstation Compute	Dell Precision Workstation Computers (ESRI Capable)					
Dell Monitors (Dual Monitors)	Dell Monitors (Dual Monitors)					
		$1,500	$1,500	$1,500	$1,500	
Instructor Development Machine						
Dell Precision Workstation Compute	Dell Precision Workstation Computers (ESRI Capable)					
Dell Monitors (Dual Monitors)	Dell Monitors (Dual Monitors)					
		$1,500	$1,500	$1,500	$1,500	
Student Lab Machines						
Dell Precision Workstation Compute	Dell Precision Workstation Computers (ESRI Capable)					
Dell Monitors (Dual Monitors)	Dell Monitors (Dual Monitors)					
		1500 x 5,10,20	$7,500	$15,000	$30,000	
External Hardrives (mobility)	WD	$100 per external harddriv	$500	1,000	2,000	
Server	Dell	$500	$500	$500	$500	
Instructor Development Laptop	Dell	1,500 - 2,500 per laptop	$1,500	$1,500	$1,500	
Dell Precision Laptops (ESRI Capable	Dell	1,500 - 2,500 per laptop X 2	$3,000	$4,500	$5,500	
Geospatial Tools						
Plotter (Large format map printing)	Canon or HP DesignJet	3,000 - 5,000	$5,000	$5,000	$5,000	
Plotter supplies contract (Paper/Ink	Canon or HP	$ 300 - 500 per semester	$500	$500	$500	
Printer	Cannon LaserPrinter	$350 - 500	$500	$500	$500	
Flatbed Scanner		$200	$200	$200	$200	
Roll Scanner		$2,000 - 5,000	$5,000	$5,000	$5,000	
Mapping Grade GPS	Trimble Geo7	$1,500 - 7,000	$5,000	$5,000	$5,000	
Survey Grade GPS	Trimble r10 GNSS				$10,000	
Digital Cameras	Canon					
Drones	DJI Drone	$2,000 - 5,000	$5,000	$5,000	$5,000	
MicroSoft Surface Tablet		$749 - 2,000	$2,000	$2,000	$2,000	
Virtual Reality Headset Set-Up	HTC VIVE			$799.00	$799.00	
Virtual SandBox	With Erica Harvey	Open Source parts from G	$0	$0	$0	
			$39,755	$50,554	$77,554	
			plus annual costs	plus annual costs	plus annual costs	

2020 Geography, GISc, Spatial Science Minors in Higher Education

MISSION	Minor/Certificate	On Line Fully (F)/Partial (P)	Undergraduate Bachelors	Masters	Doctorate Ph.D.	Center	State-Of-the-Art Spatial Lab	GISP Portfolio Prep	High School/University Joint Degree	Executive Programs/Public Leadership	Applied Experience	Scholarships/Fellows	Study Abroad	GIS Minor Core Courses and STUDY AREAS (X)																			
														Introduction to Geography	World Regions	Digital Earth	Geographic Data Analysis/Exploratory Spatial Analysis	Geographic Information Science	Applied Geographic Information Science	Geographic Information Science Design and Implementation	Geographic Information Science Cartography	Geographic Information Science Project	Introduction to Remote Sensing	Introduction to Virtual Reality	Geospatial Information Management	Geospatial Information Ethics	Science Based Program/Physical Geogrpahy	Human Geography Based	Geospatial Based	Scholarships/Fellows	College Geography Bowl
(Using RACI Matrix)																																
WEST VIRGINIA																																
Fairmont State University https://www.fairmontstate.edu/																																
Marshall University https://www.marshall.edu/giscience/undergraduate/	x	F		x	x		x				x		x	x	x		x	x	x	x	x	x	x		x	x	x	x	x	x		
West Virginia University https://online.wvu.edu/programs/geographic-information-systems-and-spatial-analysis-graduate-certificate	x	F		x	x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Concord University http://catalog.concord.edu/preview_program.php?catoid=12&poid=1796&hl=geography&returnto=search	x	P	x				x				x			x		x	x	x	x	x	x	x				x		x		x		x
West Liberty University https://westliberty.edu/geography/	x					x	x							x	x														x			
PENNSYLVANIA																																
Indiana University of Pennsylvania https://www.iup.edu/georegionalplan/undergrad/geospatial-intelligence-analysis-undergraduate-certificate/				x			x																									
Pennsylvania State University				x			x																									
Shippensburg University of Pennsylvania				x			x																									
Temple University	x			x	x		x																									
University of Pittsburgh at Johnstown	x				x																											
Villanova University				x			x																									
West Chester University.				x	x		x																									
MARYLAND																																
Salisbury University		P		x			x																									
Towson University				x			x																									
University of Maryland, Baltimore County	x			x	x		x																									
University of Maryland, College Park							x																									
VIRGINIA																																
George Mason University	x	x	x	x	x																											
James Madison University																																
Old Dominion University	x	x	x	x																												
Radford University	x						x																									
University of Mary Washington	x		x				x																									
University of Richmond			x				x																									
Virginia Tech			x	x	x		x																									
DISTRICT OF COLUMBIA																																
George Washington University		F	x	x																												
OHIO			x	x	x																											
Kent State University			x	x																												
Miami University of Ohio	x	F	x	x																												
Ohio University	x	F	x	x																												
Ohio Wesleyan University			x																													
University of Cincinnati			x	x	x																											
University of Toledo			x	x	x																											

***Completed overview for West Virginia colleges and universities. Only looked at minor courses for other states.**