MEMORANDUM TO: Ogden College of Science and Engineering Curriculum Committee

Dr. Taha Alyousef
Dr. Doug Harper
Dr. Michelle Jackson
Dr. Pat Kambesis
Dr. Phil Lienesch
Dr. Jeremy Maddox
Dr. Andy Mienaltowski
Dr. Les Pesterfield
Dr. Todd Willian

FROM: Greg Arbuckle, Interim Chair

SUBJECT: Agenda for Thursday, December 5, 2019 4:00 p.m. in OCH 1028

A. OLD BUSINESS:

I. Consideration of the minutes of the November 21, 2019 meeting.

B. NEW BUSINESS:

Type of item	Description of Item & Contact Information
Information	The following proposals were submitted via the expedited review process: **Proposal to Revise Course Catalog Listing** CHEM 475, Selected Topics in Chemistry **Proposal Revise Course Prerequisites/Corequisites** CHEM 490, Materials Chemistry
Consent	**Proposal Revise Course Prerequisites/Corequisites** BIOL 446/CHEM 446, Biochemistry I, 3 hrs. Contact: Jeremy Maddox, Jeremy.maddox@wku.edu, x8725
Consent	**Proposal to Revise Course Prequisites/Corequisites** AMS 217, Industrial Materials, 3 hrs. Contact: Mark Doggett, mark.doggett@wku.edu, x6951
Action	**Proposal to Make Multiple Revisions to a Course** CHEM 476, Advanced Investigations in Chemistry Laboratory, 2 hrs. Contact: Jeremy Maddox, Jeremy.maddox@wku.edu, x8725
Action	**Proposal to Make Multiple Revisions to a Course** CHEM 491, Materials Chemistry Laboratory, 3 hrs. Contact: Jeremy Maddox, Jeremy.maddox@wku.edu, x8725
Action	**Proposal to Create a New Program** Environmental, Sustainability, and Geographic Studies, 120 hrs Contact: Fred Siewers, fred.siewers@wku.edu, x5988
Action	**Proposal to Revise Course Credit Hours** CE 342, Fluid Thermal Sciences, 3 hrs. Contact: Jason Wilson, Jason.wilson@wku.edu, x2322
Action	**Proposal to Revise a Program** Ref. 534, Civil Engineering, 130 hrs. Contact: Jason Wilson, Jason.wilson@wku.edu, x2322

C. OTHER BUSINESS

Minutes – OCSE Curriculum Committee **November 21, 2019**

Members Present:

Dr. Taha Alyousef
Dr. Michelle Jackson
Dr. Pat Kambesis
Dr. Phil Lienesch
Dr. Jeremy Maddox
Dr. Andy Mienaltowski
Dr. Todd Willian
Dr. Mike Carini for Dr. Doug Harper
Guest: Dr. Huanjing Wang
Guest: Dr. Warren Campbell
Guest: Mr. Jason Wilson

FROM: Greg Arbuckle, Interim Chair

The meeting was called to order at 4:00pm.

OLD BUSINESS:

Mienaltowski/Willian moved to approve of the minutes of the October 31st meeting. Motion passed.

NEW BUSINESS:

Information Agenda:

Mienaltowski/Jackson motioned to move all informational CS proposals to the action agenda. The committee suggested a friendly amendment to each proposal. The proposals will be submitted via the expedited review process.

Consent Agenda

Mienaltowski/Willian motioned to move the proposal to Revise Course Prerequisites: CE 176 to the action agenda. After some discussion, Mienaltowski/Willian moved to approve. Motion passed unanimously.

Jackson/Maddox moved to approve the remaining consent agenda. Motion passed unanimously.

Action Agenda

Agriculture & Food Science Department

Jackson/Lienesch moved to approve Proposals to Make Multiple Revisions to a Course: HORT 419. Motion passed unanimously.

Mienaltowski/Lienesch moved to approve Proposal to Revise a Program: Ref. 205, Associate Degree in Agriculture. Motion passed unanimously.

School of Engineering & Applied Sciences

Mienaltowski/Lienesch moved to approve Proposal to Revise a Program, Ref. 518, Architectural Sciences, 81 hrs. Motion passed unanimously with a friendly amendment.

Mienaltowski/Jackson moved to approve Proposal to Create a New Certificate Program: Floodplain Management. Motion passed unanimously.

Jackson/Kambesis moved to approve Proposal to Create a new Course, CS 301, Game Programming. Motion passed unanimously with a friendly amendment.

Mienaltowski/Willian moved to approve Proposal to Create a new Course, CS 290, Computer Science II. Motion passed unanimously with a friendly amendment.

Mienaltowski/Jackson moved to approve Proposal to Create a new Course, CS 331, Data Structures. Motion passed unanimously with a friendly amendment.

Jackson/Willian moved to approve Proposal to Make Multiple Revisions to a Course: CS 339, Computer Science III. Motion passed unanimously with a friendly amendment.

Mienaltowski/Willian moved to approve Proposal to Revise a Program, Ref. 342, Minor in Computer Science. Motion passed unanimously with a friendly amendment.

Mienaltowski/Kambesis moved to approve Proposal to Revise a Program, Ref. 629/629P, Computer Science. Motion passed unanimously with a friendly amendment.

OTHER BUSINESS:

None.

Proposal Date: 09/19/2019

Ogden College of Science & Engineering
Department of Chemistry
Proposal to Revise Course Catalog Listing
(Consent Item)

Contact Person: Jeremy B. Maddox, jeremy.maddox@wku.edu, 5-8725

1. **Identification of course:**
   1.1 Course prefix (subject area) and number: CHEM 475
   1.2 Course title: SELECTED TOPICS IN CHEMISTRY

2. **Current course catalog listing:**

   Special topics are presented to acquaint advanced students with significant problems and developments of current interest in the fields of analytical, biological, inorganic, organic, physical, polymer and coal chemistry. The course may be repeated for credit provided topics differ.

3. **Proposed course catalog listing: (aim for 25 words or less)**

   Special topics are presented to acquaint advanced students with significant problems and developments of current interest in the field of chemistry.

4. **Rationale for revision of the course catalog listing:**

   The proposed revision reduces the length of the catalog listing. The ability to repeat CHEM 475 for credit will be articulated in the program description. For example, CHEM 475 is an elective course and may not be used as a substitute for any of the following courses: CHEM 320, 330 or equivalent, 340/1, 342/3, 420/1, 435/6, 446, 450/1, or 452/3.

5. **Proposed term for implementation:**
   First available

6. **Dates of prior committee approvals:**

Department of Chemistry	**11/1/2019**
Ogden College Curriculum Committee	
Professional Education Council (if applicable)	N/A
General Education Committee (if applicable)	N/A
Undergraduate Curriculum Committee	
University Senate	

Proposal Date: 09/19/2019

Ogden College of Science & Engineering
Department of Chemistry
Proposal to Revise Course Prerequisites/Corequisites
(Consent Item)

Contact Person: Jeremy B. Maddox, jeremy.maddox@wku.edu, 5-8725

1. **Identification of course:**
   - 1.1 Course prefix (subject area) and number: CHEM 490
   - 1.2 Course title: MATERIALS CHEMISTRY

2. **Current prerequisites/corequisites/special requirements:**

   Prerequisites: CHEM 330 and CHEM 412 or 452 with a grade of "C" or better

3. **Proposed prerequisites/corequisites/special requirements:**

   Prerequisites: CHEM 320, CHEM 330, and CHEM 342 with a grade of "C" or better

4. **Rationale for the revision of prerequisites/corequisites/special requirements:**

   CHEM 320, 330, and 342 provide a foundation-level experience in inorganic, analytical, and organic chemistry, respectively, which is sufficient preparation for an interdisciplinary course in materials chemistry.

5. **Effect on completion of major/minor sequence:**
   None

6. **Proposed term for implementation:**
   First available

7. **Dates of prior committee approvals:**

Department of Chemistry	**11/1/2019**
Ogden College Curriculum Committee	
Professional Education Council (if applicable)	N/A
General Education Committee (if applicable)	N/A
Undergraduate Curriculum Committee	
University Senate	

CHEM 446 Revise Pre/Coreq

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

x For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.
This change is primarily related to the suspension of CHEM 314.
The Biology Department has also approved the proposal.
Further contact outside the department was not deemed necessary.

x What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

None

N/A If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

x Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Stuart Burris Digitally signed by Stuart Burris Date: 2019.11.25 15:51:05 -06'00'

Department Head

Dean or Designee

11/25/2019
Date

Date

Proposal Date: 09/13/2019

Ogden College of Science & Engineering
Department of Chemistry
Proposal to Revise Course Prerequisites/Corequisites
(Consent Item)

Contact Person: Jeremy B. Maddox, jeremy.maddox@wku.edu, 5-8725

1. **Identification of course:**
   - 1.1 Course prefix (subject area) and number: BIOL 446/CHEM 446
   - 1.2 Course title: BIOCHEMISTRY I

2. **Current prerequisites/corequisites/special requirements:**

   Prerequisite: CHEM 314 or 340 with a grade of "C" or better.

3. **Proposed prerequisites/corequisites/special requirements:**

   Prerequisite: CHEM 340 with a grade of "C" or better.

4. **Rationale for the revision of prerequisites/corequisites/special requirements:**

   The Chemistry Department has no plans to offer CHEM 314 in the future.

5. **Effect on completion of major/minor sequence:**
   None. Students should take CHEM 340-341 as the prerequisite for BIOL 446/CHEM 446.

6. **Proposed term for implementation:**
   First available

7. **Dates of prior committee approvals:**

Department of Biology	**11/22/2019**
Department of Chemistry	**10/4/2019**
Ogden College Curriculum Committee	
Professional Education Council (if applicable)	
General Education Committee (if applicable)	N/A
Undergraduate Curriculum Committee	
University Senate	

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

☑ For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

The department chair of Chemistry (Dr. Stuart Burris) was contacted on 04.01.2019.
The construction Mgt Program Coordinator, Dr. Bashar Haddad was contacted 3/20/19.

☑ What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

Estimated impact is approximately 50 students per year.

☐ If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

☑ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Stacy Wilson Digitally signed by Stacy Wilson Date: 2019.10.28 11:29:56 -05'00'

Department Head

Dean or Designee

Date

Date

Proposal Date: August 15, 2019

Ogden College of Science and Engineering
School of Engineering and Applied Sciences
Proposal to Revise Course Prerequisites/Corequisites
(Consent Item)

Contact Person: Mark Doggett, mark.doggett@wku.edu, 270-745-6951

1. **Identification of course:**
   - 1.1 Course prefix (subject area) and number: AMS 217
   - 1.2 Course title: Industrial Materials

2. **Current prerequisites:**
   - 2.1 Prerequisite: MATH 116 with a grade of "C" or better, or MATH 117 or better

3. **Proposed prerequisites:**
   - 3.1 Prerequisite: MATH 116 with a grade of "C" or better, or MATH 117 or better and CHEM 105/106 or CHEM 120/121

4. **Rationale for the revision of prerequisites/corequisites:**
   Historically, students in the class are not prepared on the chemistry-related portion of material science. A fundamental knowledge on the chemistry of materials will result in better student performance in the class.

   This change aligns with current knowledge expectations in industry, the accreditation board, and in the School of Engineering and Applied Sciences.

   Construction Management coordinator Dr. Bashar Haddad was contacted and agreed to change on 3/20/2019. The Chemistry Dept Chair was contacted on 8/15/2019 and approved this change. Approximately 50 students per year will be affected.

5. **Effect on completion of major/minor sequence:**
   Students who have not completed the course by spring 2020 will be required to take the new prerequisites.

6. **Proposed term for implementation:** Fall 2020

7. **Dates of prior committee approvals:**

School of Engineering and Applied Sciences	**9/27/19**
Ogden College Curriculum Committee	
University Senate	

CHEM 476 - Multiple Revisions

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

☑ For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

CHEM 476 is not required by any program or used as an elective by any program; therefore, there are no external impacts to this change

☑ What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

No staffing or budget impacts for this change

☐ If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

☑ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Stuart Burris Digitally signed by Stuart Burris Date: 2019.11.25 14:04:50 -06'00'

Department Head

Dean or Designee

11/25/2019

Date

Date

Proposal Date: 09/19/2019

Ogden College of Science & Engineering
Department of Chemistry
Proposal to Make Multiple Revisions to a Course
(Action Item)

Contact Person: Jeremy B. Maddox, jeremy.maddox@wku.edu, 5-8725

1. Identification of course:

1.1 Current course prefix (subject area) and number: CHEM 476

1.2 Course title: ADVANCED INVESTIGATIONS IN CHEMISTRY LABORATORY

2. Revise course title:

2.1 Current course title: ADVANCED INVESTIGATIONS IN CHEMISTRY LABORATORY

2.2 Proposed course title: SELECTED TOPICS IN CHEMISTRY LABORATORY

2.3 Proposed abbreviated title: SEL TOPICS IN CHEMISTRY LAB

2.4 Rationale for revision of course title:
The proposed title revision more precisely reflects the ability to pair the CHEM 476 laboratory course with the CHEM 475 Selected Topics in Chemistry lecture course.

3. Revise course number:

3.1 Current course number:

3.2 Proposed course number:

3.3 Rationale for revision of course number:

4. Revise course prerequisites/corequisites/special requirements:

4.1 Current prerequisites/corequisites/special requirements: (indicate which)
Prerequisite: Permission of the instructor.

4.2 Proposed prerequisites/corequisites/special requirements:
Prerequisite: Consent of instructor.

4.3 Rationale for revision of course prerequisites/corequisites/special requirements:
The proposed revision is a minor wording change that will make the prerequisite more consistent with the Department's other courses that require consent of the instructor.

4.4 Effect on completion of major/minor sequence:
None

5. Revise course catalog listing:

5.1 Current course catalog listing:

A course for advanced students involving assigned laboratory work in the field of inorganic chemistry. Typical procedures and experiments are those involving the synthesis, characterization, and identification of various chemical compounds, using a variety of handling techniques, and the application of various physical methods. Course Fee

5.2 Proposed course catalog listing:

Special laboratory techniques are presented to acquaint advanced students with significant problems and developments of current interest in the field of chemistry. Course Fee

5.3 Rationale for revision of course catalog listing:

The scope of the course is broadened to advanced laboratory work in any chemistry sub-discipline.

6. Revise course credit hours:

6.1 Current course credit hours: 2
6.2 Proposed course credit hours: 1-3
6.3 Rationale for revision of course credit hours:

The proposed variable credit hours allows for maximum flexibility in the design of the a special topics laboratory that may accompany a special topics lecture course.

7. Revise schedule type:

7.1 Current schedule type:
7.2 Proposed schedule type:
7.3 Rationale for revision of schedule type:

8. Revise grade type:

8.1 Current grade type:
8.2 Proposed grade type:
8.3 Rationale for revision of grade type:

10. Proposed term for implementation:

First available

11. Dates of prior committee approvals:

Department of Chemistry	**11/1/2019**
Ogden College Curriculum Committee	
Professional Education Council (if applicable)	N/A
General Education Committee (if applicable)	N/A
Undergraduate Curriculum Committee	
University Senate	

CHEM 491 - Multiple Revisions

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

☑ For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

CHEM 491 is not required by any program or used as an elective by any program; therefore, there are no external impacts to this change

☑ What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

No staffing or budget impacts for this change

☐ If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

☑ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Stuart Burris Digitally signed by Stuart Burris Date: 2019.11.25 14:04:50 -06'00'

Department Head

Dean or Designee

11/25/2019

Date

Date

Proposal Date: 09/19/2019

Ogden College of Science & Engineering
Department of Chemistry
Proposal to Make Multiple Revisions to a Course
(Action Item)

Contact Person: Jeremy B. Maddox, jeremy.maddox@wku.edu, 5-8725

1. Identification of course:

1.1 Current course prefix (subject area) and number: CHEM 491

1.2 Course title: MATERIALS CHEMISTRY LABORATORY

2. Revise course title:

2.1 Current course title:

2.2 Proposed course title:

2.3 Proposed abbreviated title:

2.4 Rationale for revision of course title:

3. Revise course number:

3.1 Current course number:

3.2 Proposed course number:

3.3 Rationale for revision of course number:

4. Revise course prerequisites/corequisites/special requirements:

4.1 Current prerequisites/corequisites/special requirements: (indicate which)

Prerequisites: CHEM 330 and CHEM 412 or 452 with a grade of "C" or better

4.2 Proposed prerequisites/corequisites/special requirements:

Prerequisites: CHEM 320, CHEM 330, and CHEM 342 with a grade of "C" or better

4.3 Rationale for revision of course prerequisites/corequisites/special requirements:
The proposed revision is a minor wording change that will make the prerequisite more consistent with the Department's other courses that require consent of the instructor.

CHEM 320, 330, and 342 provide a foundation-level experience in inorganic, analytical, and organic chemistry, respectively, which is sufficient preparation for an interdisciplinary laboratory in materials chemistry.

4.4 Effect on completion of major/minor sequence:
None

5. Revise course catalog listing:

5.1 Current course catalog listing:

5.2 Proposed course catalog listing:

5.3 Rationale for revision of course catalog listing:

6. Revise course credit hours:

6.1 Current course credit hours: 3

6.2 Proposed course credit hours: 1-3

6.3 Rationale for revision of course credit hours:

The proposed variable credit hours allows for maximum flexibility in the design of the materials chemistry laboratory that can be offered as a stand alone laboratory or alongside CHEM 490.

7. Revise schedule type:

7.1 Current schedule type:

7.2 Proposed schedule type:

7.3 Rationale for revision of schedule type:

8. Revise grade type:

8.1 Current grade type:

8.2 Proposed grade type:

8.3 Rationale for revision of grade type:

10. Proposed term for implementation:

First available

11. Dates of prior committee approvals:

Department of Chemistry	**11/1/2019**
Ogden College Curriculum Committee	
Professional Education Council (if applicable)	N/A
General Education Committee (if applicable)	N/A
Undergraduate Curriculum Committee	
University Senate	

New Program : ESGS

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

☑ For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

Contact was made with the Department of Public Health regarding their B.S. in Environmental and Occupational Health Science(Dr. Ritchie Taylor, Program Leader) to discuss possible conflict or overlap and it was determined that there is not overlap or duplication given the focus of their program on health and occupational settings. They are supportive of this new program and its potential to contribute to a possible future interdisciplinary environmental science program.

☑ What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

No additional staffing will be required as the program is a merger of existing programs.

☑ If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

☑ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Fredrick D. Siewers

Digitally signed by Fredrick D. Siewers
Date: 2019.12.01 18:36:21 -06'00'

Department Head

Dean or Designee

12/01/2019

Date

Date

PRE-PROPOSAL FOR NEW ACADEMIC PROGRAM

Western Kentucky University

Institution Submitting Proposal

Bachelor of Science

Program Type

Environmental, Sustainability, and Geographic Studies

Title of Proposed Degree Program

Undergraduate

Degree Level

EEO Status	
CIP Code	03.0103
Academic Unit (e.g. Department, Division, School)	Ogden College of Science and Engineering
Name of Academic Unit	Department of Geography and Geology
Name of Program Director	Dr. Fred Siewers
Date of pre-proposal	
End of review period	
Intended Date of Implementation	Fall 2020
Name, Title and Information of Contact Person	Dr. Fred Siewers Chair, Department of Geography and Geology Fred.siewers@wku.edu (270 745-5988

For guidance on this form and the process, see:
http://www.wku.edu/academicaffairs/pd/program_development.php and/or contact Rheanna Plemons (rheanna.plemons@wku.edu)

Is this program a pre-baccalaureate certificate or diploma program? Y___ N__X__

- If YES, is the program Technical/Occupational/Vocational
- Please provide documentation that this program was approved by the KCTCS Board of Regents N/A

A. Centrality to the Institution's Mission and Consistency with State's Goals

1. Provide a brief description of the program.

a. Does this program have any specializations? Y___ or N__X__
If yes, add specialization name, add specialization description.

This program is proposed as part of the WKU comprehensive program review (CAPE), wherein the institution supported the forward thinking of the Department of Geography and Geology to transform its majors in Geography and Environmental Studies and GIS into a merged, single major. The **new program in Environmental, Sustainability, and Geographic Studies** (ESGS) will enhance student training, follow market trends, capitalize on faculty expertise and research, and streamline the current majors in various concentrations within the degrees undergoing transformation. This will make advising and programming more efficient for majors and also provide them with a degree that integrates the skills and topics that are necessary and relevant to today's workforce demands.

The Environmental, Sustainability, and Geographic Studies program focuses on environment-related issues using scientific, technological, and humanistic approaches to understand the interactive nature and interdependence of environmental and human factors. The program is structured around foundational courses, technical course work, and applied real-world experiences. Foundational instruction introduces students to basic principles of environmental science and related subjects, such as sustainability science, environmental planning, pollution control, natural resource management, spatial data analysis, economics, cultural geography, and the general interactions of humans and nature. The program will prepare students for thinking critically about the complexities of human-environmental interactions through technical course work encompassing scientific writing, quantitative skills and data analysis, applied field- and lab-based experiences, and effective use of geospatial technologies (e.g., GIS and cartography, GPS, radar, satellite, drone, photogrammetry, environmental quality monitors, and surveying). Since the geoenvironmental sector is very broad in scope, the major does not include pre-defined and narrow concentractions. Instead, the program will allow students to complete a customized set of elective coursework that best prepares them for a graduate program or any one of the wide ranging careers in the environmental field that they find of most interest. The program not only will prepare students with essential knowledge in the fields of environment and sustainability, but will also train students with critical information processing and geospatial analysis skills to meet the demands of employers in diverse industries with information-age needs in the 21st Century.

2. What are the objectives of the proposed program?

In combining the existing programs of Geography and Environmental Studies and Geographic Information Systems (GIS) into a holistic, multidisciplinary program, the overall program goal is to meet the evolving needs of students entering the emerging fields of sustainability, environmental management, and geospatial analysis. The specific objectives of the proposed program are to ensure that students can:

- Master core concepts and methods from the environmental, sustainability, and geographic sciences and apply them in solving social, economic, and resource problems;
- Master core concepts and methods from urban, political, and technical analysis as they pertain to the design and evaluation of policies and institutions that shape the daily lives of Kentuckians;
- Appreciate the ethical, cross-cultural, and historical context of environmental, sustainability, and geographic issues and the critical links between humans and their natural systems;
- Understand the broader spatial character of human-environment problems and ways of addressing them, including interactions across local to global scales;
- Apply systems concepts and methodologies to analyze and understand interactions between humans and the natural environment, and to sustain healthy interactions between humans and the natural and built environment;
- Reflect critically about student roles and identities as citizens, consumers, and environmental actors in a complex, interconnected world;
- Develop skills to communicate environmental, sustainability, and geographic concepts, risks, and approaches to protect and manage natural resources within a humanistic context.
- Demonstrate proficiency in the quantitative methods, qualitative analysis, spatial analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary environmental, sustainability, and geographic scholars and/or practitioners.

Overall, the proposed program in Environmental, Sustainability, and Geographic Studies is designed to meet the momentous realities of environmental change and the need for sustainable development by empowering students to solve emerging challenges with an integrative, geospatial- and science-based approach that acknowledges linkages between global human-environment systems. Environmental Sustainability, and Geographic Studies provide critical lenses for understanding – across the human-environment interface, across space, and at multiple scales – that foster comprehensive, ethical, and lasting change.

3. Explain how the objectives support the institutional mission and strategic priorities, and the statewide postsecondary education strategic agenda.

The mission of WKU is "to prepare students of all backgrounds to be productive, engaged, and socially responsible citizen-leaders of a global society. The University provides research, service and lifelong learning opportunities for its students, faculty, and other constituents. WKU enriches the quality of life for those within its reach."

Productive citizens have the ability to adapt to a changing world and often rise to become leaders in their communities. Processes of globalization, reflected by technological innovation and cultural diffusion, are drivers of rapid change in the structure of society. At the same time, issues of sustainability challenge society from the local to the global scale to keep pace with resource utilization and management. Now, more than at any time, an informed geographic perspective is an asset in society. Further, there is a growing need for people with knowledge and technical skills to analyze and understand the massive volume of geospatial and environmental data that are being collected each day to support decision making in both the public and private sectors. The B.S. in Environmental, Sustainability, and Geographic Studies program is focused specifically on providing students with an educational experience that meets their needs and those of society. The curriculum has evolved through

the years to emphasize substantive issues regarding the environment, sustainability, globalization, cultural awareness, and place-based learning, while expanding opportunities and expectations for students to acquire technical skills involving the analysis and interpretation of geospatial and environmental data.

The subdisciplines of sustainability and environmental studies are concerned with understanding the complexities of human-environment interactions through applied learning and a holistic approach, similar to geography and its global approach. The Environmental, Sustainability, and Geographic Studies program aims to be the region's outstanding geoenvironmental program by incorporating geographic information skills as a tool to assist our students in decision-making processes in the Kentucky workforce and beyond. It aims to produce exceptional undergraduates through engagement in critical-thinking and meaningful problem-solving using a systems-based approach. There are many opportunities for students in the program to get out of the classroom and aid in solving real-world problems through involvement in field research, internships, and applied learning activities. This program will incorporate meaningful research and community engagement in its courses and in the overall program.

The proposed program complements other majors in the Department (Meteorology and Geology), as well as the Master's program (through the Joint Undergraduate-Masters Program or JUMP) via common core courses and strong interdisciplinary training, creating synergies that enhance both the student experience and retention. Because of the interdisciplinary nature of the program, and the high demand for the applied skills taught through its coursework, students from multiple colleges and departments (such as education, agriculture, political science, criminology, journalism, history, social studies, engineering, and biology, etc.) participate in our program courses. Additionally, since every education major at WKU must take a Geography of Kentucky or History of Kentucky course to complete the degree, approximately 100 elementary education majors annually are able to graduate WKU because of our program.

The Kentucky Council on Postsecondary Education lists the following priorities in its strategic agenda for 2016-2021:

- Encourage more people to take advantage of postsecondary opportunities
- Increase degree and certificate completion, fill workforce shortages, and guide more graduates to a career path
- Create economic growth and development and make our state more prosperous.

Priority 1: Encourage more people to take advantage of postsecondary opportunities. The B.S. in The B.S. in Environmental, Sustainability, and Geographic Studies attracts students due to the ubiquity of media coverage and the national conversation about climate change and other environmental issues. The rapid global exchange of information makes students aware of the environmental impacts that past human decisions have had on our current and future lives. Incoming students are aware that a career in environmental studies and sustainability is important to solving the societal problems. Enrollments in the existing Geography and Environmental Studies program and the Geographic Information Systems certificate have increased over the past two years (see table below),

Degrees Awarded and Current Students Enrolled in the two Merging Programs

Degrees Awarded	AY19	AY18	AY17	AY16	AY15
GIS Certificate	7	8	13	8	14
B.S. Degree GEO*	9	21	15	16	16
Enrolled August 15th	**AY19**	**AY18**	**AY17**	**AY16**	**AY15**
GIS Certificate enrolled	24	16	12	11	10
GEO Majors**	74	49	51	58	67

* B.S. Geography and Environmental Studies plus B.S. in GIS

** Majors in B.S. Geography and Environmental Studies plus B.S. in GIS, after accounting for degrees awarded, as of August 15th each academic year.

Priority 2: Increase degree and certificate completion, fill workforce shortages, and guide more graduates to a career path. WKU has been vigorously promoting retention over the past few years. The Department of Geography and Geology and the Ogden College of Science and Engineering each has a recruitment and retention committee. Graduating students fill workforce shortages in the state, such as positions requiring GIS expertise (see section C for data on job availability and placement). The program has a required Professional Preparation course (GEOG 499), which guides students though their career path by preparing resumes, transforming skills gained through coursework to applicable workforce job qualities, honing interview skills, and guiding students through job searches that should result in a rewarding career.

Priority 3: Create economic growth and development and make our state more prosperous. Students who graduate with the B.S. in Environmental, Sustainability, and Geographic Studies degree will take on jobs in public service and the private sector. These careers require innovation and integration of technology and software in job duties and performance demands, all of which are emphasized in this program, and will lead to our graduates piloting new departments and divisions in the fields of environmental planning, sustainability coordination, and GIS and geospatial analysis. Job market data clearly indicate rapid expected growth in these fields, and our program's customization will allow us to train students who should achieve desireable salaries, and create further growth in these sectors.

4. Is an approval letter from Education Professional Standards Board (EPSB) required?

No - Not Applicable

B. Program Quality and Student Success

1. What are the intended student learning outcomes of the proposed program?

The specifics of these broad learning outcomes for the Environmental, Sustainability, and Geographical Studies program can be divided into three broad categories and are aligned with Bloom's Taxonomy for learning outcomes which are also listed below and included in Section F.

Student Learning Outcome #1 – Foundational Courses
Students will demonstrate engagement with the fundamental principles of environment, sustainability, and human geography to develop discipline-specific knowledge and skills within the program of study. Students will learn how the concepts such as place, scale, region, and diffusion, which make up an environmental geographer's 'toolkit', can be used for identifying, mapping, and quantifiably analyzing environmental data and geospatial patterns of human and natural environments, as well as the interaction between the two. Students can articulate the pillars of sustainability as they relate to the individual, community, and world.

Student Learning Outcome #2 – Technical and Professional Courses
Students will demonstrate competence in written and visual communication through research and writing experiences in the program. Students will demonstrate how qualitative/quantitative measures can be used to assess, report, and design approaches that address sustainability challenges and opportunities. Students will be able to articulate the principles of the scientific method. Within a projects-based learning model, students will be able to apply geospatial principles and provide quantifiable assessment of geospatial and environmental data, as well as demonstrate operational knowledge of GIS software.

Student Learning Outcome #3 – Career Emphasis Courses (Electives)
Students can explain the complexities of social, cultural, and environmental diversity, and demonstrate critical thinking and evidence-based argument skills related to diverse, complex, and nuanced real-world social, cultural, environmental, and sustainability problems in geospatial and socioenvironmental contexts in preparation for their specific professional career aspirations.

Overall Program Learning Outcomes:

Create

- Generate holistic plans to solve local-to-global issues using knowledge and technology.
- Develop meaningful datasets to enable analysis of complex socioenvironmental issues.

Evaluate

- Critique standards and develop sustainable improvements.
- Critically evaluate resource management practices and governing policies.
- Evaluate "big data" within a spatial and geographical context for problem-solving using GIS and other sub-discipline specific techniques.

Analyze

- Analyze relationships and apply critical thinking to decision-making processes and present the information appropriately to various stakeholders.
- Analyze complex datasets by integrating cultural/human and physical/environmental variables to contextualize broader interpretations for application in a globalized setting.
- Identify pattern variability at multiple temporal and spatial scales using GIS.

Apply

- Execute fieldwork and research to collect data regarding socioenvironmental problems.
- Implement geographic information science to recognize patterns and evaluate probable causes and solutions.

- Articulate basic environmental concepts, sustainability pillars, and geographical priniciples and convey an understanding of their value and importance to stakeholders and the public.
- Use applied learning and problem solving to approach complex socioenvironmental issues.
- Practice sustainable approaches to problem solving from the local to global scales.

Understand

- Interpret data in order to understand the intersection of the cultural, environmental, and physical relationships in the world.
- Compare and contrast circumstances from place to place to recognize how actions and policies can predict outcomes.

Remember

- Recognize that contemporary problems and challenges are the product of history and inertia, and that spatial understanding and interpretation requires research, reflection, as well as the burden of responsibility for future decisions and consequences.
- Build a knowledge base of concepts that relate to cultural, environmental, and physical relationships of the world.

In summary, students who complete our program will be well-prepared to succeed in their chosen career paths, fully capable of applying their critical thinking skills and their technical and scientific expertise, to effectively solve problems at the local, regional, and global scales. Our graduates will have the intellectual abilities and necessary scientific tools to examine, synthesize, and better understand the complexities of social and environment diversity. Students will be influential in civic engagement and as informed members of society, well-equipped to meet the needs of ever-emerging challenges and technologies. Students who earn their degree in Environmental, Sustainability, and Geographical Studies at WKU will have the confidence and knowledge to effect change and to enter the workforce with marketable technical and communication abilities.

2. How will the program support or be supported by other programs within the institution?

The Environmental, Sustainability, and Geographic Studies major will support all other majors in the Department of Geography and Geology and beyond. Program coursework is inextricably Intertwined with METR, GEOL, and the Master's program through JUMP. For example, GEOG 300 (*Writing in the Geosciences*) is required by all majors in any program offered through Geography and Geology. Program faculty teach across all major programs. In consultation with an advisor, students will be able to take courses in other departments such as Biology, Criminology, Chemistry, or Public Health to fulfill elective options, in consultation with an advisor. The major will support other programs across the institution. For example, a student majoring in Photojournalism or Business can pursue electives in this major to give them background in environment or sustainability, or they can actually pursue it as a double major or second degree. This major will also support the certificate in Geographic Information Systems. This certificate is critical to a variety of disciplines that involve the analysis and mapping of varying forms of geospatial data (Criminology, Biology, History, etc.). Students who complete the certificate will have a solid foundation that spans the collection, management, analysis, automation, and display of data using geospatial technologies such as GIS. The proposed major will also complement the existing Geology and Metherology degree programs housed within the Department of Geography and Geology through common core learning outcomes, and will provide additional interdisciplinary opportunities through elective courses that will count toward the Geology major. Most innovatively, this program sets the

stage for a future interdisciplinary environmental science degree that could draw from resources in Public Health, Biology, Engineering, and other departments to provide a new opportunity for students to engage in this more technical and specific type of training.

3. Will this program replace or enhance any existing program(s) or tracks, concentrations, or specializations within an existing program? If yes, please specify.

As part of the WKU comprehensive program review (CAPE) the Department of Geography and Geology, supported by the Institution, proposed to transform the program. The transformation involves merging the Geography and Environmental Studies and GIS programs into a single major that better enhances student training, follows market trends, capitalizes on faculty expertise and research, and streamlines concentrations of the existing program.

4. Will this be a 100% distance learning program?

No, the program is not a 100% distance learning program.

5. Will this program utilize alternative learning formats (e.g. distance learning, technology-enhanced instruction, evening/weekend classes, accelerated courses)?

a. If yes, please check all that apply).

- Distance learning (*majority of the instruction occurs when the student and faculty are not in the same place*) – **yes, some courses may be taught in distance learning format**
- Courses that combine various modes of interaction, such as face-to-face, videoconferencing, audio-conferencing, mail, telephone, fax, e-mail, interactive television, or World Wide Web? – **yes**
- Technology-enhanced instruction – **yes**
- Evening/weekend/early morning classes – **yes, some evening (4 pm start time) and early morning (8 am start times) courses will be included**
- Accelerated courses (*courses that can be complete in less than a traditional semester*) – **yes, some courses may be taught using the five-week enhanced learning schedule or the standard bi-term schedule, depending on demand**
- Instruction at nontraditional locations, such as employer worksite – **yes, trips to explore laboratory and other workplace and field-based education will be utilized, as well as internship opportunities as part of the core requirements**
- Courses with multiple entry, exit, and reentry points – **no**
- Courses with "rolling" entrance and completion times, based on self-pacing – **no**
- Modularized courses (*standalone segments or components of a parent course for which content has been determined and credit assigned. The sum of the constituent modules is equal to the credit of the parent course. Credit is awarded upon successful completion of all modules comprising the parent course.)* – **no**

6. Are new or additional faculty needed?

a. If yes, please provide a plan to ensure that appropriate faculty resources are available, either within the institution or externally, to support the program.

Not Applicable. This program represents a merger of two existing degree programs already supported by existing faculty lines and teaching and technological resources.

7. Curriculum

a. Explain how the curriculum achieves the program-level student learning outcomes by describing the relationship between the overall curriculum or the major curricular components and the program objectives.

b. Please upload the curriculum including full course names and course descriptions (see Appendix A for curriculum table template).

The relationship between the proposed program curriculum and the program objectives to achieve the learning outcomes is shaped by the interdisciplinary nature of the coursework and linkages between foundational, technical, and advanced career emphasis elective courses. Metalevel program objectives are to train students in environmental, sustainability, and geographic concepts that can be applied in community, business, educational, and regulatory settings to help improve the social and economic quality of life of all Kentuckians and beyond. Program curriculum is designed to drive student learning outcomes to integrate program objectives at three levels: macro (program-level objectives/goals), meso (course-level outcomes), and micro (student- and employer- level outcomes).

The program's core curriculum achieves overall program onjectives by preparing students to:

- Master foundational concepts and methods from the environmental, sustainability, and geographic sciences and apply them in solving social, economic, and resource problems (Either GEOG 103 or GEOL 111 or METR 121);
- Master foundational concepts and methods from urban, political, and technical analysis as they pertain to the design and evaluation of policies and institutions that shape the daily lives of Kentuckians in a global setting (GEOG 110 and GEOG 380);
- Demonstrate technical proficiency in quantitative methods, qualitative analysis, spatial analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners (GISC 316, GISC 317, GEOG 391);
- Understand the historical and scientific context of environmental concepts, sustainability, and the critical links between humans and their natural systems; be able to integrate the scientific method and the application of environmental science concepts to mitigrating environmental problems (GEOG 280);
- Understand the broader spatial character of human-environment problems and ways of addressing them, as well as the pillars of sustainability, including interactions across local to global scales (GEOG 380 or GEOG 480);
- Apply systems concepts and methodologies to analyze and understand interactions between humans and the natural environment (either GEOG 452 or 475 or 495);
- Reflect critically about student roles and identities as citizens, consumers, and environmental actors in a complex, interconnected world (GEOG 300 and 499).

The elective courses (21 hours) available in the curriculum of the proposed program allow students to apply foundational skills to specific contexts relevant to their career goals. Guided by a custom-designed career pathway developed in coordination with the program advisor, students can select an integrated set of advanced courses that build on foundational skills and help them to apply their

analytical, communication, and scientific reasoning skills to a variety of the social and economic challenges faced by Kentuckians.

C. Program Demand/Unnecessary Duplication

1. Provide justification and evidence to support the need and demand for this proposed program. Include any data on student demand; career opportunities at the regional, state, and national levels; and any changes or trends in the discipline that necessitate a new program.

a. Student Demand (*explain how faculty and staff systematically gathered data, studied the data and estimated student demand for the program. Anecdotal evidence is not sufficient.)*

Student demand for the merged major being proposed is reflected through survey input from students and from the increase in enrollment of students wishing to pursue an environment-related degree. During 2018-19, a survey of over 200 students (both majors and non-majors) in multiple lower-level courses offered within the Department of Geography and Geology, indicated 33% of respondents would pursue this degree program if offered and over 50% indicated they would take coursework within the major. The program provides the broad and interdisciplinary interests needed to meet the rapidly growing student demand for this degree. Since Fall 2018, the number of majors has doubled within the existing Geography and Environmental major, with the majority of the growth in the Environmental Studies concentration, as well as a significant increase in the number of students pursuing a GIS certificate in the Department's GIS program. The growth in these areas and demonstrated student demand, as indicated through chosen concentration in the current major and course enrollment, are driving the focus of this merger to meet the growing student need.

Student Enrollment over 5 year period

Enrollment	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Geography & Environmental Studies	48	43	43	39	74	94
GIS Certificate	10	11	12	16	21	24

*2019-2020 enrollment data anticipate demand through Spring 2020

Nationally, there is strong focus on sustainable practices in the public sector and for almost all industries in the private sector. Businesses across the country, as well as federal, local, and state governments, have made significant investments toward becoming more environmentally responsible and better global citizens. That investment is a continuing trend because of heightened public interest in the hazards facing the environment, as well as increasing demands placed on the environment by population growth, climate change, water-resource demand, cultural and paradigm shifts, and improvements in technology and development. Environmental and sustainability issues are relevant to public concerns about hazards that impact humanity (climate change, natural impacts such as volcanic eruptions, flooding, and severe weather). The current and future workforce, by necessity, will need to remediate and ultimately be responsible for managing both natural and built environments and their resources, as well as determine how to balance human need/use with the functions of natural

systems. Addressing these environmental issues is a cornerstone of current and future job markets and this program's focus for training students.

The unique combination of the proposed disciplines makes this degree program highly attractive and unlike others offered in the state or at other benchmark institutions, which will be an advantage in marketing it to meet the types of jobs and various sectors of growth in Kentucky and beyond in this area, as described below. Specifically, this program not only emphasizes human-environmental interaction through environmental science and human geography pedagogy, and promotes long-term systems thinking through the principles of sustainability, it also integrates GIS technology training, which is one of the fastest growing, in-demand skills across multiple sectors of the economy from manufacturing and distribution to urban planning and national park management, among others. This combination of skillsets and disciplinary coursework also makes the major unique among Kentucky higher education programs.

Anticipated demand in number of majors is expected to be 15% per year over the next five years. Student demand for programs in environment and sustainability, and the growth of enrollment in the GIS certificate, is driving the focus of this merger to meet the growing student need.

Projected enrollment in the proposed transformed major

Year 1 (2018/19)	Year 2	Year 3	Year 4	Year 5
74	94	110	137	158

b. Career Opportunities

The number of jobs for sustainability and environmental management doubled both from 1995-2003 and from 2003-2008; since then, these fields have seen even faster growth, with companies like Apple, UnderArmour, Nike, Walmart, and others hiring positions in these areas and creating company cultures centered on sustainable, environmentally-conscious, and globalized business models (University of Wisconsin 2019). Market demand in the environmental sector is projected to grow 6-9% between 2018 through 2028 (Occupational Outlook Handbook 2019). Geospatial technology has strong projected job growth in business, industry, and the public sector. The U.S. Department of Labor, Employment, and Training Administration (DOLETA) projects an annual growth rate of approximately 35 percent for the entirety of the geospatial technology industry, with reliable public sector revenue accounting for approximately one third of the industry's total annual receipts. P&S Market Research estimates a compound annual growth rate of 11 percent from 2015 to 2020 for the global GIS market.

Based on data from O*NET, sustainability specialist is considered a new and emerging "Bright Outlook" occupation projected to have 100,000 or more job openings between 2016 and 2026 (University of Wisconsin 2019). Sustainability specialists are responsible for addressing organizational sustainability issues, such as waste-stream management, green building practices, and green procurement plans, and made a median salary of $69,040 in 2016. Jobs in renewable energy are expected to see growth over 96% by 2026 according to the U.S. Bureau of Labor Statistics, with most related sustainability fields following close behind.

The estimated overall total of jobs in the environmental and geospatial technology sector as of 2018 is 261,900. The combined projected growth in these fields was 7.3% between 2018 to 2028. This translates to incredibly high market demand for the program we are proposing given its cross-training potential to best prepare students for these evolving and growing careers.

Summary of job statistics for Environmental and Spatial Technologies sectors.

SOC	Title	Employed in 2018	Change: 2018-2028	2018 Median Wage($)	%Change: 2018-2028
17-1021	*Cartographers & Photogrammetrists*	11,800	1,700	64,430	15
19-3051	*Urban & Regional Planners*	39,100	4,200	73,050	11
19-4091	*Environmental Science & Protection Techs*	34,800	3,200	46,170	9
19-2041	*Environmental Scientists & Specialists*	85,000	7,000	71,130	8
17-3031	*Surveying & Mapping Techs*	56,800	3,100	44,380	5
19-1031	*Conservation Scientists*	32,900	1,000	61,340	3
19-3099	*Geographers/Social Scientists*	1,500	45	80,300	3
	Estimated Overall Total Jobs for 2018 =	261,900			
	Estimated Overall Total Wages for 2018 =	$23.5 billion			

Based on data from: *U.S. Bureau of Labor Statistics 2018*

Summary of growth and salary statistics by job type for Environmental and Spatial Technologies sectors.

	Type of Job	Regional	Regional Growth Projection	State	State Growth Projection	National	National Growth Projection
	Cartographers and Photogrammetrists						
Average Wage				$54,652	9.0%	$ 64,430	15%
# of openings				12		118	
	Environmental Engineering Technicians						
Average Wage				$74,885	9.3%	$ 87,620	5%
# of openings				7		553	
	Surveying and Mapping Technicians						
Average Wage				$40,456	9.3%	$ 44,380	5%
# of openings				7		567	
	Conservation Scientists						
Average Wage				$61,761	9.5%	$ 61,340	3%
# of openings				5		328	
	Environmental Scientists and						
Average Wage				$51,654	9.5%	$ 71,130	8%
# of openings				5		849	
	Urban and Regional Planners						
Average Wage				$57,255	9%	$ 73,050	11%
# of openings				12		390	
	Environmental Science and Protection Technicians, Including Health						
Average Wage				$45,862	8.7%	$ 46,170	9%
# of openings				13		347	
	Forest and Conservation Technicians						
Average Wage				$37,620	3.0%	$ 37,180	1.3%
# of openings				1		6	
	Geographers/Social Scientists						
Average Wage				$65,994	3.0%	$ 80,300	3%
# of openings				3		14	

Market Demand by Job Sectors (Kentucky vs. National)

Environment/ Sustainability	Currently employed	Change: 2018-2028	% Change: 2018-28	Estimated total wages: 2018	Estimated total wages: over 10 years	Openings per year	Median Salary
Kentucky*	3,468	269	9%	$ 183,782,252	$1.8 billion	27	$56,018
National**	208,100	14,100	6%	$ 14,525,000,000	$145 billion	1410	$66,565

Geospatial Technologies	Currently employed	Change: 2018-2028	% Change: 2018-28	Estimated total wages: 2018	Estimated total wages: over 10 years	Openings per year	Median Salary
Kentucky*	1,250	91	9%	$ 30,479,195	$305 million	9	$53,700
National**	109,200	9,045	9%	$6,257,763,000	$62.5 billion	905	$65,540

Overall typical education:	BSc
Overall typical experience:	none
Overall typical training:	none

Sources: * Kentucky Occupational Outlook, 2018; ** Bureau of Labor Statistics, 2018

In addition to preparing students to enter the job market immediately, the Environmental, Sustainability and Geographic Studies major will provide excellent preparation for graduate school. The increasing growth in related majors across the state and nationally, as well as the increase in student awareness of environmental issues, demonstrates that the demand for this type of program is at its highest ever. The core courses supply students with a solid background in environmental sciences, environmental sustainability, proficiency in geoscience writing, expertise in spatial analytical technologies, competence in basic statistical analyses, hands-on field- and laboratory-based applied research experiences, and knowledge and skills critical for success in a variety of programs at the graduate level. Students graduating from the program will have the requisite background to enter a broad number of graduate programs in environmental science, environmental law and policy, geospatial analysis, geosciences, and related fields.

c. Change in Discipline *(If the program is being proposed to meet changes in the academic discipline, please outline those changes and explain why they necessitate development of a new program.)*

Sustainability is considered to be a relatively new field; one that has been gaining traction for over a decade. The concept of sustainability was initially proposed by the World Commission on Environment and Development (WCED) (1987) and is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Today, sustainability is recognized globally as a key issue facing twenty-first century society and it is just as broadly understood that achieving sustainability requires multidisciplinary approaches, specifically environmental and geographic perspectives. In 2007, there were 32 sustainability science programs in

US colleges and universities. That number has now increased to well over 100. WKU has its own Office of Sustainability and engages students from across the university who seek a home to pursue this as a an area of interest.

Though environmental and geographical studies and geospatial analysis are not new disciplines, they are all enhanced when combined into a multidisciplinary program. The addition of sustainability to the proposed new program's multidisciplinary academic mix will provide students with the knowledge and training that will prepare them for careers of the future. This program is innovative and designed to meet the growing market demand for these types of careers, per the data in Tables 3-5, and will carve a unique niche in its interdisciplinary programmatic approach to serve students across Kentucky, WKU's primary recruitment region.

References:

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2. Specify any distinctive qualities of the program.

The Environmental, Sustainability, and Geographic Studies program will focus on the integration of human-environmental systems through the application of technological, geospatial, and sustainable principles, to study built and natural environments through a local-to-global lens. This program would be the first and only one of its kind to provide students within the Commonwealth with the multidisciplinary training needed to tackle some of the most pressing geo-environmental issues facing society, both now and in the future. This training will be achieved through applied and integrative learning that draws upon the analytical, social, environmental, and technical skills found in this combination of complementary courses. Collectively, this degree will provide students with a distinctive and customized program to develop the broad range of skills required to be successful in the rapidly

expanding field of environmental, sustainability, and geographical jobs. The program's quality derives from its curriculum design, which aims to produce graduates who can critically think from both local to global, spatial to temporal, and social to physical, in dealing with complex issues like sustainable development in environmentally stressed regions, resource management in culturally-sensitive landscapes, and human dimensions of climate change, among others. Students earning this degree will graduate with a skillset that prepares them to pursue careers at the forefront of socio-environmental problem solving, unlike any other program offered at benchmark institutions, given the carefully constructed, interdisciplinary approach of the curriculum to integrate geospatial technology, analytical writing, and a sustainable perspective on environmental issues.

The strength of this program comes in the diversity of faculty expertise and use of technology in the courses offered. The changes to the program, and the diversity of our faculty expertise, will allow greater flexibility for students to select elective courses that fit their interest and help better meet their future professional and academic goals. We are able to offer students applied experiences in the environmental science, sustainability, and geographic fields that they are unable to get elsewhere. Our private and public sector collaborators at international, national, and regional levels allow our faculty to bring real-world experiences into their course curriculum, as well as create opportunities for our students to participate in internship, research projects, and service-learning projects that we could otherwise not offer them. This proposed program will offer an unmatched worldview to our students through our comprehensive approach to studying human-environmental interactions.

3. If similar programs exist (*the systems will populate a table based on CIP code*)

a. Does the proposed program differ from existing programs in terms of curriculum, focus, objectives, etc.? If yes, please explain.

Western Kentucky University, through the Environmental, Sustainability, and Geographic Studies program, will offer the only undergraduate degree program in the region with an integrated specialization in environmental sciences, sustainability science, human geography, and geospatial science in a single degree program. There are similar programs with a specialization in individual subsets in those disciplines, but no program will equip students with them all; thus, our combined environmental studies, sustainability science, human geography, and GIS program will be distinctively different from the geography and/or environmental science or studies programs at other state-supported institutions such as the University of Kentucky (UK), University of Louisville (UL), Eastern Kentucky University (EKU), Northern Kentucky University, and Murray State University.

For example, since the program at UK is a relatively new B.A., and our program is designed as a B.S. degree, our major will allow for the integration of coursework that expands beyond the social aspects of environmental studies covered in the B.A. program at UK. The Environmental Studies program at EKU is housed in the Department of Biological Sciences and offers a more generalized program related to the environment with a focus on biological sciences, wherein students must also take courses across multiple departments to meet degree requirements. Our program, by comparison, is designed to be more focused in the environmental geosciences and integrates geospatial analysis (GIS) and sustainability concepts, which are completely separate and intensive aspects that provide students with a richer experience related to the human-environmental systems interaction and data-driven management aspects of these fields. The curricula have minimal overlap in course themes between the two programs and our B.S. is designed to be custom tailored to students seeking more interdisciplinary training outside of just the physical and biological sciences in order to be marketable for a broader range

of jobs. The UL program focuses primarily on sustainability pedagogy, whereas sustainability is but one of the pedagogical fields covered in the proposed WKU major. The Murray State program is also a B.S. program, and students in this major identify distinct tracks with coursework narrowly focused on that track area. In contrast, our degree program will feature coursework across the geoscience, environmental, sustainability, human geography, and geospatial technology fields to give students a well-rounded and diverse set of skills and knowledge. The interdisciplinary and custom-designed aspect of our program is unique from any other environmentally related program in the state. Lastly, NKU has a B.S. program that focuses heavily on the physical sciences (biology, geology, and physics) and a B.A. program that focuses heavily on social science and cultural courses. Students in our program will complete coursework that will cover both physical and cultural aspects of the environment and geosciences, while also integrating geospatial analysis (GIS) and sustainability concepts.

In addition to combining content areas not combined elsewhere in the state, the major proposed herein applies a 'custom-design' strategy, which will allow majors to build a set of elective coursework to prepare them for their specific career goals within the very diverse environmental sector. As one example, students in our program at WKU have the opportunity to specialize in cave and karst tourism studies, which combines analytical skills with applied practices in the areas of human and environmental geography. No other similar program in Kentucky can make that claim. These qualities will make this WKU program unique in the educational opportunities extended to undergraduates in Kentucky. We will provide students with a highly specialized educational experience that is easily applied to real-word problem solving. Finally, through leveraged research center partnerships at WKU and the expertise of our faculty, our program will offer students study abroad experiences and opportunities in international partnerships (such as those with the Caribbean Community Climate Change Centre) that are not comparable to any experiences offered through other Kentucky institutions. In summary, the program proposed herein will offer students a unique educational and professionalizing experience; we will provide students with a highly specialized educational program that is easily applied to real-word problem solving.

b. Does the proposed program serve a different student population (i.e., students in a different geographic area, non-traditional students) from existing programs? If yes, please explain.

In addition to serving students from a broad region, nationally and internationally, WKU has traditionally played a special role in serving many students from the western half of Kentucky and central Tennessee. That traditional student base sets the proposed program apart from existing programs at Eastern Kentucky University, the University of Kentucky, and the University of Louisville. The student populations between the two EKU and WKU programs would be similar in some aspects, given that both are regional, comprehensive teaching institutions; however, within the program, the EKU student population seeking this degree would be coming from biology backgrounds and likely with different pathways in mind, given that our program is more rooted in the geosciences and would draw from engineering, public health, geology, journalism, sociology, meteorology, and other related disciplines as students discover and pursue this major. There is a very large geographic distance between NKU and WKU, serving different student populations, so the two schools are not commonly considered competitors for one another.

CPE data indicates that there is a STEM Gap in Kentucky, with women choosing to pursue undergraduate and graduate degrees in STEM disciplines at about half the rate of men (CPE 2019). The proposed

program in Environmental, Sustainability, and Geographic Studies will help alleviate the gap through its proven strong appeal to female undergraduates at WKU. Over the past five years, while enrollment in the B.S. in Geography and Environment has almost doubled (see enrollment data table in section C1), the percentage of women among this number has risen from about 30% to 55%.

c. Is access to existing programs limited? If yes, please explain.

No

d. Is there excess demand for existing similar programs? If yes, please explain.

The current enrollment of >75 in the WKU B.S. program in Geography and Environmental Studies, the program that is transitioning to the proposed program in Environmental, Sustainability, and Geographic Studies, has nearly doubled in the past year, despite growth in other related programs at benchmark institutions, which indicates there is robust demand within WKU's service area. These are students who have chosen to attend WKU given its status as a regional lighthouse for environmental, sustainability, and GIS work, from which this program combines those strengths into a clearer, more focused degree. The Department also houses three WKU Centers of Excellence, including the Kentucky Climate Center and Mesonet, the Crawford Hydrology Lab, and the Center for Human GeoEnvironmental Studies, all of which are thriving and recruit students for funded research opportunities, engaged learning in the discipline, and enhance visibility for this new program.

Reference

CPE, 2019, accessed November 2019. "Number of females earning STEM credentials in Kentucky increasing, but not at same rate as males,"
https://cpe.ky.gov/_resources/images/weeklyinfographics/infographic-091219.jpg

4. Describe how the proposed program will articulate with related programs in the state. It should describe the extent to which students transfer has been explored and coordinated with other institutions. Attach all draft articulation agreements.

Not applicable directly through specific agreements, but transfer students from any related programs will be given every opportunity to transfer in courses that meet program requirements, which should work in their favor given the customized nature of the program.

D. Cost and Funding of the Proposed Program

1. Estimate the level of new and existing resources that will be required to implement and sustain the program using the spreadsheet below (*if amount other than $0, an explanation/justification required*).

Use the required CPE Excel spreadsheet (Revenue and Expenses Worksheet) from the Program Development website: http://www.wku.edu/academicaffairs/pd/program_development.php

Given that this is a merger of two existing programs, there are no pertinent budget impacts; however, the budgetary rational for creating this new program is to promote efficiencies and effectiveness of instructor resources within the Department of Geography and Geology and Ogden College at WKU. By combining disciplines and faculty within this new major, we are able to offer a stronger degree, a wider variety of focused courses drawing from an existing faculty pool, and handle a large increase in the number of majors using the existing size of the Department and its resources, which will maximize tuition generation and minimize salary expenditure. The new program is expected to be highly attractive to students and will reach students beyond the traditional service area of WKU. The program will increase the number of STEM + H degrees and the number of underrepresented populations graduating with said degrees, an important metric in the WKU Strategic Plan - *Climbing To Greater Heights* 2018-2028 (https://www.wku.edu/strategicplan/).

Projected Revenue and Expenses over Next Five Years

	Year 1	Year 2	Year 3	Year 4	Year 5
Majors	80	94	110	137	158
All Credit Hours	6,700	6,950	7,200	7,800	8,200
Revenue	$2,297,630	$2,325,559	$2,450,222	$2,632,987	$2,858,540
Expenses	$1,058,413	$1,069,000	$1,079,690	$1,090,490	$1,101,395

-- Revenue is based on WKU's full-time student tuition rate multiplied by the estimated enrollment numbers. Year 1 tuition is same as FY20 tuition ($10802 for the AY); each successive year assumes a 1% increase in tuition.
-- Expenses are based on faculty/staff current salaries for FY20 for year 1 with a 1% increase in personnel expenses each successive year, based on faculty actually teaching in the proposed (and existing) program.
---Total credit hours includes all general education courses offered by the program, including courses taken by majors.
--Data calculated from salary information plus 39% base fringe.

F. Program Assessment

1. **Describe how each program-level student learning outcome will be assessed and how assessment results will be used for improving the program.** *(Explain which student learning outcome(s) will be assessed by each assessment method and how frequently each assessment method is administered. Include both direct and indirect methods. Explain how assessment results will be used to make improvements to the program. Note that this item refers to program-level, not course-level, assessment and thus course grades are not an appropriate source of data for program –level assessment*).

The Program faculty subscribe to the general philosophy that short-term, snapshot evaluations of learning outcomes are statistically suspect and do not provide robust-enough data to suggest meaningful improvements. Consequently, we take a longer view of course assessment and learning

outcomes, preferring to look at trends over time and to survey graduates from time to time to determine what worked and what needed improvement. Additionally, since program objectives must drive student learning outcomes, we aim to assess the program at three levels: macro (program-level assessment of objectives/goals), meso (course-level assessment), and micro (student- and employer-level assessment).

As the Environmental, Sustainability, and Geographic Studies program represents a merger of existing programs in Geography and Environmental Studies and GIS, we feel it is appropriate to include a discussion of our current strategies for program evaluation since they can be applicable to the new program. Specifically, students' assessments of their learning experiences are in line with overall WKU teaching outcomes as reported on SITES course evaluations; yet, the program will take multiple approaches to assessing learning outcomes:

1. Create

- Generate holistic strategies to solve world issues using knowledge and technology
- Develop meaningful datasets to address complex socioenvironmental issues

Assessment Criteria: Review selected course curricula annually (20% sample) to ensure that learning outcome #1 is embedded appropriately in course content. Evaluate selected prompts from core courses annually, in concert with WKU assessment strategies for Colonnade/General Education coursework. If learning outcome #1 is weak in any areas, make appropriate curriculum changes. For example, GEOG 225 Visualizing Geography was created recently to address systematically the types of strategies and datasets used to address global issues. GISC 216 Geotechnologies in a Global Community has been revamped to include more relevant datasets pertinent to students' interests.

2. Evaluate:

- Critique standards and develop sustainable improvements
- Critically evaluate resource management practices and governing policies
- Evaluate "big data" within a spatial and geographical context for problem-solving

Assessment Criteria: Review selected course content annually (20% sample) to ensure that learning outcome #2 is embedded appropriately in the curriculum. Evaluate selected prompts from required courses annually, in concert with WKU assessment strategies for Colonnade/General Education coursework. If learning outcome #2 is weak in any areas, make appropriate curriculum changes. For example, GEOG 300 Writing in the Geosciences was revised recently to focus on specific evaluative strategies discussed in the geoscience literature and applied to global problem-solving strategies, thus strengthening the evaluative skills required in the program.

3. Analyze:

- Analyze relationships and apply critical thinking to decision-making processes and present the information appropriately to various stakeholders
- Analyze complex datasets by integrating cultural/human and physical/environmental variables to contextualize broader interpretations for application in a globalized setting

Assessment Criteria: Review course prompts in required technical courses such as GISC 216, 316, 317, and GEOG 391 annually (10% sample) to ensure that appropriate datasets addressing human-environment challenges are relevant and valid. Faculty teaching analytical courses meet annually to review course requirements and make appropriate revisions.

4. Apply:

- Execute fieldwork and research to collect data regarding socioenvironmental problems
- Implement geographic information science to recognize patterns and evaluate probable causes and solutions
- Articulate basic environmental concepts, sustainability pillars, and geographical principles and convey an understanding of their value and importance to stakeholders and the public
- Use applied learning and problem solving to approach complex socioenvironmental issues
- Practice sustainable approaches to problem solving from local to global scales

Assessment Criteria: Evaluate internship and practicum reports from employers annually to determine satisfaction levels with skill applications in appropriate contexts. Identify any weaknesses in skill application, such as communication (writing) or data analysis (GIS), and adjust relevant coursework appropriately. For example, employer feedback encouraged revision of a unit in GEOG 499 Professional Development to address professional presentations.

5. Understand:

- Interpret data in order to understand the intersection of cultural, environmental, and physical relationships of the world
- Compare and contrast circumstances from place to place to recognize how actions and policies can predict outcomes

Assessment Criteria: Review selected course curricula annually (20% sample) to ensure that learning outcome #5 is embedded appropriately in course content. Evaluate selected prompts (5% sample) from elective courses annually to determine if there is a clear level of understanding of foundational principles applied to advanced course content. If learning outcome #5 is weak in any areas, make appropriate curriculum changes. For example, GEOG 480 Urban Geography is under revision to address content weakness in how sustainability practices are understood in the context of global environment change – the course is renamed Sustainable Cities. GEOG 499 Professional Development administers an assessment exit exam each Fall semester to determine if the broad level of program content understanding is within an acceptable target range.

6. Recognize and Remember:

- Recognize the spatial and temporal decisions that determine the situation of the world at present.

Assessment Criteria: Review selected final exams annually (5% sample from elective coursework) to ensure that learning outcome #6 is evident in student responses. Using a program faculty jury system, the review will determine if at least 60% of the sample material demonstrates a clear recognition of appropriate decisions in context. Past assessment from Colonnade/General Education courses revealed that students were deficient in understanding the impacts of natural and human events at a variety of scales, so the program developed GEOG 226 Dangerous Planet and GEOG 227 Vulnerable Planet to focus explicitly on human-environment activities affected by both natural and anthropogenic events.

Overall, program faculty collect assessment material annually and address the following questions:

1. Needs Assessment:
    - What condition/situation/outcome in the program is not working?
    - What elements are in need of improvement?

- Why does that condition/situation/outcome exist?
- What is contributing to it?

2. Assessment of Program Learning Outcomes:
   - Are the program learning outcomes plausible based on the research literature in the discipline?
   - Do our stakeholders (students, employers, and/or subject matter experts) think these are reasonable and feasible?

3. Process Evaluation:
   - Is the program reaching the targeted recipients?
   - Is the program being implemented as planned/designed?
   - Are implementation benchmarks and outcomes (recruitment, retention, and graduation rates at or above institutional targets) being reached?
   - How is the program progressing (as measured by student success indicators and recruitment indicators)? Compared to last year? A month ago?
   - What challenges has the program faced?
   - What improvements/changes in strategies are needed for the program to reach intended outcomes?

4. Impact or Outcome Evaluation:
   - What were the intended outcomes of the program (see learning outcomes above)?
   - What changes did we hope to achieve? Did we achieve those intended/hoped for outcomes?
   - Did the program yield the same results for all participants? Was the program more effective for some? If so, why?
   - What were (any) unintended outcomes of the program?

5. Efficiency Assessment:
   - Do the benefits of the program outweigh the costs, based on institutional measures of effectiveness? Is the program generating more revenue than expense, based on the institutional RAMP model?
   - Is the program showing a return on its investment? How can this be measured externally? Responses from employers and alumni?

We regularly reach out to employers of recent graduates to determine if our students are leaving the program with the skillsets necessary to be successful in the geography and environmental studies field. Employers of graduates have informally expressed that they are impressed and satisfied with students graduating from our pogram. These employers include, but are not limited to, the US Army Corp of Engineers, Fruit of the Loom Headquarters (Bowling Green), EnSAFE (a national environmental consulting firm), Tennessee Department of Transportation, Mammoth Cave National Park, Federal Bureau of Land Management, Forestry Service in Alaska and Tennessee, City County Planning Commission of Warren County, Bowling Green Municipal Utilities, and Bowling Green Public Works Division, among others. Private employers, such as EnSAFE (a national environmental consulting firm) have not only employed multiple graduates of our program, but also accept many current students into their paid internship positions. Their repeated willingness to employ our students (and allow them to serve as interns) indicates satisfaction with our graduates. We feel the new merged program will enhance further the satistifcation of employers as our students will now have even broader and complementary skillsets from which they can pull to meet workplace demands.

Appendix A: Curriculum for the Environmental, Sustainability, and Geographic Studies major

Program Core Courses (32 Credit Hours)				
Prefix & Number	**Course Title**	**Course Description**	**Credit Hours**	**New (Yes or Not)**
		Introductory Physcical Earth Course		
GEOG 103	Our Dynamic Planet	103 - Introduction to the spatial dimension of Earth's dynamic systems and how they affect people. These include the atmosphere, hydrosphere, and lithosphere.	3	Not
GEOL 111 or	The Earth	111 - The study of Earth including rocks, mineral resources, energy, soils, surface geologic processes, earthquakes and Earth's interior, global tectonics, hydrology, and environmental geology		Not
METR 121	Intro to Meteorology	121 - An introduction to the elements of the atmosphere, severe storms, atmospheric environmental issues, the interdependence between human life and the atmosphere, and rudimentary forecasting of basic weather systems.		Not
		Introductory Human/Cultural Geography Course		
GEOG 110	World Regional Geography	A general survey of the political, social, and ecological systems of the world. The course is concerned with the complexity and diversity of world peoples and cultures.	3	Not
		Introductory Environmental Science Course		
GEOG 280	Intro to Environmental Science and Sustainability	A general understanding of how the environmnet functions, the complexity of human-environmental interactions, and the application of geoscience in solving environmental problems. Lab component provides practical experiences associated with the theories outlined in the course content	4	Not
		Sustainability Course		
GEOG 380 or	Global Sustainability	380 - An introduction to the major themes and scientific principles of sustainability, with an emphasis on developing critical thinking skills	3	Not
GEOG 480	Sustainable Cities	480 - This course explores the evolution and consequences of urban development and the essentials of sustainable urbanism. The environmental, geographical, and human costs of urbanization will be examined, with an emphasis on the impacts of urbanization on populations, landscapes, mobility, resource		Not - Revising

		consumption, and urban response to sustainability issues and climate change.		
		Technical Courses		
GISC 316	Fundamentals of GIS	Fundamentals of GIS data management and cartographic design. Topics include data organization, map projections, scale and accuracy. Hands-on work in geospatial data acquisition, base map development, and map production.	4	Not
GISC 317	Geographic Information Systems	The principles, concepts, and applications of GIS. Topics include raster and vector data models, GIS data sources, data acquisition, storage, management, structured query language, relational databases, GIS analysis, and display.	4	Not
GEOG 391	Spatial Data Analysis	Statistical concepts and methods emphasizing their applications in a spatial context. Statistical description and hypothesis testing. Visualization analysis of spatial patterns and relationships. Note: Special permission of instructor may be required.	4	Not
GEOG 300	Wrinting in the Geosciences	Students conduct investigations into writing, reading, and research conventions in the geosciences and receive advanced instruction in planning, drafting, arranging, revising, and editing geoscience-specific essays and research projects.	3	Not
		Professional Preparation Courses		
GEOG 499	Professional Preparation	Professional career or graduate school preparation, resume writing, college-to-career transition, professional ethics, graduate school application and requirements, written senior assessment, and selected seminar topics. Outside speakers from industry and academia will be included.	1	Not
GEOG 452	Applied Geoscience Field Experiences (Study Abroad)	Applied geoscience experiences in a variety of field-based settings, including, but not limited to, Study Abroad programs, field camps, and extended fieldtrips to national/intern. settings.	3	Not
GEOG 495	Research Practicum or Internship	Supervised research or internship with faculty, government, community, or private concerns.	3	Not
or				
GEOG 475	Speciality Course	This number is reserved for one-time offer speciality courses in the program.	3	Not

**This program will not include concentrations.

Electives

Elective Courses (21 credit hours)				
Prefix & Number	**Course Title**	**Course Description**	**Credit Hours**	**New (Yes or No)**

To align with the custom-design structure of this program, no predetermined electives will be listed in the major. Instead we propose the following language: "Elective coursework selected from any GEOG, GISC, METR, or GEOL 200-400 level course with advisor approval. Up to six hours may be taken outside of the geoscience discipline with advisor approval." This structure will allow students to build a set of elective coursework that prepares them for their specific professional careers within the board environmental sector. Courses offered in the Department include subjects such as "Water Resources", "Environmental Planning", "Global Climate Change", "Energy, Climate, and Carbon", "Natural Resource Management", "Principles of Remote Sensing", "Physical Hydrology", "Geomorphology", "Visualizing Geography", "Food, Culture, and Environment", "Karst Environments", and "GIS Analysis and Modeling" among many others.

Dates of Committee Approvals:

Committee	**Date Approved**
Department of Geography and Geology	11-22-19
College of Science and Engineering	
Professional Ed Council, if Teacher Education	n/a
Undergraduate Curriculum Committee	
University Senate	
Board of Regents	

WKU	**BACHELOR of SCIENCE in ENVIRONMENTAL, SUSTAINABILITY, AND GEOGRAPHIC STUDIES** Department of Geography and Geology Ogden College of Science and Engineering Western Kentucky University
	The suggested program of study shown below should be used in consultation with your advisor(s). Every student will finish with a unique plan of his/her own depending on the electives selected. This program is designed to be customizable to your specific area of interest within the discipline.

SAMPLE – Finish in Four Plan

FIRST YEAR (Freshman Year)			
GEOL 103 or 111 Earth	3	GEOG 110 S&B Fndtns	3
ENG 100 Writing	3	MATH 183 Statistics	3
MATH 116 Algebra (Colonnade MATH)	3	GEOG 210 Environmental Policy	3
HIST 101 or 102 (Colonnade History)	3	COMM 145 (Colonnade Comms)	3
GEOG 175 Freshman	2	GEOG 280 Env Sust Lab	4
SEMESTER CREDIT HOURS	**14**	**SEMESTER CREDIT HOURS**	**16**

SECOND YEAR (Sophomore Year)			
Connections Local- Global	3	GEOG 300 Writing (Colonnade Writing)	3
GISC 316 GIS Intro	4	GISC 317 GIS II	4
Language Colonnade	3	Connections S&B	3
Colonnade Arts Human	3	GEOG 380 Global Sustn	3
GEOG Major Elective	3		
SEMESTER CREDIT HOURS	**16**	**SEMESTER CREDIT HOURS**	**13**

THIRD YEAR (Junior Year)			
GEOG 391 Spatial Stats	4	GEOG Major Elective	3
ENG 200 Literature	3	University Elective	3
Connections Systems	3	GEOG 452/475/495 - Study Abroad or Resrch	4
GEOG Major Elective	3	University Elective	3
University Elective	3	GEOG Major Elective	3
SEMESTER CREDIT HOURS	**16**	**SEMESTER CREDIT HOURS**	**16**

FOURTH YEAR (Senior Year)			
Field Studies/Intern	4	GEOG Major Elective	3
GEOG Major Elective	3	Independent Research	3
University Elective	3	GEOG Major Elective	3
Independent Research	3	University Elective	3
GEOG 499 Prof Prep	1	GEOG/WKU Elective	3
SEMESTER CREDIT HOURS	**14**	**SEMESTER CREDIT HOURS**	**15**
		Total Credit Hours:	**120**

- 120 Hours total are required in the program, with 42 hours at the 300/400 level.
- Summer courses, including Study Abroad, Field Camps, and other independent research opportunities, can reduce the number of hours required in the regular semesters.
- Any of the courses can be moved from semester to semester to take advantage of courses when offered.
- The WKU Colonnade Program requires a minimum of 39 hours, with several required courses in the Geography program that can be double-counted. GEOG courses marked * count for Colonnade Credit.
- Colonnade Connections courses are restricted to Juniors/Seniors, unless 21 credit hours of Colonnade Explorations and Foundations courses have already been completed. Three disciplines are required for Connections credit (METR, GEOG, GEOL, and GISC count as separate disciplines).

REQUIRED IN THE MAJOR (53 hours): **CORE COURSES** = GEOG 103* or GEOL 111* or METR 121*, GEOG 110*, GEOG 280*, GEOG 380* or GEOG 480, GEOG 300*, GISC 316, GISC 317, GEOG 391, GEOG 452* or 475 or 495, GEOG 499 (32 hours); **ELECTIVES** = any 21 hours of approved GEOG/GEOL/GISC/METR or equivalent coursework; **PLUS** MATH 116* and MATH 183*

For more details and courses offered in the Colonnade General Education program visit the website.

World Language Requirement: Language Proficiency of novice-high before completing 60 credit hours is required (or completion of 2nd level of a language). Two credits (or equivalent) of a single world language in High School satisfies this WKU requirement.

For more Information:

Department: Geography and Geology
Website: https://www.wku.edu/geoweb/
Phone: (270) 745-4555
Email: geoscience@wku.edu
Course Descriptions: http://www.wku.edu/undergraduatecatalog/

CE 342

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

X For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

NO IMPACT

X What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

NONE

X If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

✓ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Department Head

Dean or Designee

10/7/19
Date

Date

Proposal Date:9/19/19

Ogden College of Science and Engineering
School of Engineering and Applied Sciences
Proposal to Revise Course Credit Hours
(Action Item)

Contact Person: Jason Wilson, Jason.wilson@wku.edu, 270-745-2322

1. **Identification of course:**
   1.1 Current course prefix (subject area) and number: CE 342
   1.2 Course title: Fluid Thermal Sciences
   1.3 Credit hours: 4 credit hours

2. **Proposed course credit hours:** 3 credit hours

3. **Rationale for the revision of course credit hours:**
   Course was originally part of the joint program with University of Kentucky. There was the requirement for 16 hours to be taken remotely through UK and CE 342 (formerly CE 341) was a 4 hour class to allow for only five classes to be taken remotely instead of six 3-hour classes. To compensate for a reduction of hours, there will be reduced course material in pumping systems, hydrodynamic drag, and open channel flow.

4. **Proposed term for implementation:** Fall 2020

5. **Dates of prior committee approvals:**

School of Engineering and Applied Sciences	9/13/19
Ogden College Curriculum Committee	
Undergraduate Curriculum Committee	
University Senate	

Ref. 534

University Undergraduate Curriculum Proposal Checklist

Please complete the following checklist to ensure your proposal will proceed smoothly and efficiently. Include the checklist as a cover sheet with your proposal. Proposals without the checklist will be returned to the proponent.

✓ For new or revised programs, courses, or course descriptions, what departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

ARCHITECTURAL SCIENCE - 8/13/19 MS. SHAHNAZ ALI

CONSTRUCTION MANAGEMENT 8/13/19 DR. BASHAR HADDAD

✓ What are the potential budget implications for this proposal? If any additional staffing is required, how will it be funded? If not, how will current staffing accommodate the proposed course/program?

NONE

✓ If you are proposing a new undergraduate program or changes to an existing undergraduate program, please include a new or updated four-year degree pathway.

✓ Has the proposal been checked carefully for mechanics, grammar, syntax, and clarity?

Department Head

Dean or Designee

10/7/19

Date

Date

Proposal to Revise a Program: Civil Engineering
Ogden College
Department/Unit: School of Engineering and Applied Sciences

Section 1: Proponent Contact Information

1.1 Jason C. Wilson, Instructor
1.2 Email address:Jason.Wilson@wku.edu
1.3 Phone # 270.745.2322

Section 2: Program Information

2.1 Current Program reference number: 534/534P

2.2 Current Program title: Civil Engineering/Civil Engineering Pre-major

2.3 Current total number of credits required in the program: 130

Section 3: Proposed program revisions and rationales

3.1 Delete CE 304 Construction Management Laboratory (1 credit hour) from "CE Program".

3.2 Reduce CE 342 Fluid & Thermal Science from 4 credit hours to 3 credit hours in "CE Program"

3.3 Delete CE 301 Field Experience in Floodplain Management, CE 326 Engineering Law, CE 360 Est., Scheduling Bidding, CE 361 Estimating Lab,CE 436 Design / Constr. Integration, CE 476 Highway Construction, CE 486 Steel & Concrete Constr., CE 490 UK-CE Sel. Topics (Fall), CE 491 UK-CE Sel. Topics (Spr), EE 350 Fund. of Electrical Engineering, and GEOL 308 Structural Geology from "CE Technical Electives".

3.4 Add CE 432 Traffic Engineering to "CE Technical Electives"

Section 4: Consultations
Do any of the proposed revisions in section 3 above involve or in any other way impact other departments/units? YES

The program coordinators of both Construction Management and Architectural were contacted about the droping of CE 304 Construction Management Laboaratory. All parties were in agreement about dropping the laboartory

Section 5: Proposed term for implementation: Spring 2021

Section 6: Approval Flow Dates:

SEAS: **9/13/19**
Odgen College Curriculum Committee:
Undergraduate Curriculum Committee:
University Senate:

Section 7: Required Appendices: Current & proposed program descriptions:
7.1 Current Program Requirement: 130 hours

CE Current Program		
Course	**Course Title**	**Hrs.**
CE 176 ME 176 EE 101	CE Fresh Design, ME Fresh Design, or EE Design I	1
CE 160	Prin. of Surveying	3
CE 161	Surveying Lab	1
CE 303	Constr. Management	3
CE 304	Constr. Management Lab	1
CE 305	Risk Analysis	3
CE 310	Strengths Lab	1
CE 316	Equip. & Methods	3
CE 331	Transportation Eng.	3
CE 342	Fluid & Thermal Science	4
CE 352	Intro. to Environmental Engineering	3
CE 370	Materials of Construction	2
CE 371	Matls. of Constr. Lab	1
CE 382	Structural Analysis	3
CE 384	Civil Engineering Design Course	3
CE 410	Soil Mechanics	3
CE 411	Soil Mechanics Lab	1
CE 412	Foundation Eng.	3
CE 461	Hydrology	3
ENGR 490	Senior Design Seminar	2
ENGR 491	Senior Project	3
CE	**Technical Elective***	**3**
CE	**Technical Elective***	**3**
CE	**Technical Elective***	**3**
AMS 163	Arch. Drafting	3
EM 222	Statics	3
EM 303	Mechanics of Deformable Bodies	3
TOTALS	**Credit Hours**	**68**

*Students are required to complete a total of 9 credit hours of technical electives in civil engineering or a related field. A minimum of 6 credit hours must come from CE prefixed courses.

Other Requirements		
Course	**Course Title**	**Hrs.**
MATH 136	Calculus I	4
MATH 137	Calculus II	4

MATH 237	Multivariable Calculus	4
MATH 331	Differential Equations	3
PHYS 255	University Physics I	4
PHYS 256	Physics I Lab	1
	Science or Math Elective (See list below.)**	3-5
CHEM 120	College Chemistry I	3
CHEM 121	Chemistry I Lab	2
GEOL 111	The Earth	3
GEOL 113	The Earth Lab	1
TOTALS	**Credit Hours**	**32**

**Students are required to complete one set of Science or Math Electives.

CE Technical Electives		
Course	**Course Title**	**Hrs.**
CE 300	Floodplain Management	3
CE 301	Field Experience in Floodplain Management	3
CE 326	Engineering Law	3
CE 360	Est., Scheduling Bidding	3
CE 361	Estimating Lab	1
CE 378	Boundary Surveying	3
CE 379	Boundary Surveying. Lab	1
CE 380	Route Surveying	3
CE 381	Route Surveying Lab	1
CE 383	Structural Steel Design	3
CE 426	Adv. Construction Matls.	3
CE 436	Design / Constr. Integration	3
CE 440	Masonry Construction	3
CE 444	Bridge Engineering	3
CE 462	Hydraulic Engineering	3
CE 474	Civil Eng. Design Project	1-3
CE 475	Sel. Topics in Civil Eng.	3
CE 476	Highway Construction	3
CE 486	Steel & Concrete Constr.	3
CE 490	UK-CE Sel. Topics (Fall)	3
CE 491	UK-CE Sel. Topics (Spr)	3
AMS 305	Building Codes	3
AMS 325	Surv. of Building Systems	3
CM 363	Constr. Est. and Bidding	3
CM 400	Constr. Administration	3
CM 426	Construction Law	3

EE 350	Fund. of Electrical Eng.	4
EM 313	Dynamics	3
ENGR 400	Systems Engineering	3
GISC 316	Fundamentals of GIS	4
GEOL 308	Structural Geology	4
GEOL 310	Global Hydrology	3
GEOL 415	Environmental Geology	3
GISC 317	Geog. Info. Systems	4
ME 220	Eng. Thermodynamics	3
MATH 350	Adv. Engineering Math	3

CE Program:

Students must have a grade of "C" or better in:

- All premajor courses,
- All math courses,
- Science or math elective,
- EM 303 Mechanics of Deformable Solids,
- All CE courses including technical electives (except for one (1) 300-level or 400-level CE course),

7.2 Proposed Program Requirement: 128 hours

CE Current Program		
Course	**Course Title**	**Hrs.**
CE 176 ME 176 EE 101	CE Fresh Design, ME Fresh Design, or EE Design I	1
CE 160	Prin. of Surveying	3
CE 161	Surveying Lab	1
CE 303	Constr. Management	3
~~CE 304~~	~~Constr. Management Lab~~	~~1~~
CE 305	Risk Analysis	3
CE 310	Strengths Lab	1
CE 316	Equip. & Methods	3
CE 331	Transportation Eng.	3
CE 342	Fluid & Thermal Science	3
CE 352	Intro. to Environmental Engineering	3
CE 370	Materials of Construction	2
CE 371	Matls. of Constr. Lab	1
CE 382	Structural Analysis	3
CE 384	Civil Engineering Design Course	3
CE 410	Soil Mechanics	3
CE 411	Soil Mechanics Lab	1
CE 412	Foundation Eng.	3
CE 461	Hydrology	3
ENGR 490	Senior Design Seminar	2
ENGR 491	Senior Project	3
CE	**Technical Elective***	**3**
CE	**Technical Elective***	**3**
CE	**Technical Elective***	**3**
AMS 163	Arch. Drafting	3
EM 222	Statics	3
EM 303	Mechanics of Deformable Bodies	3
TOTALS	**Credit Hours**	**68**

*Students are required to complete a total of 9 credit hours of technical electives in civil engineering or a related field. A minimum of 6 credit hours must come from CE prefixed courses.

Other Requirements		
Course	**Course Title**	**Hrs.**
MATH 136	Calculus I	4
MATH 137	Calculus II	4
MATH 237	Multivariable Calculus	4

MATH 331	Differential Equations	3
PHYS 255	University Physics I	4
PHYS 256	Physics I Lab	1
	Science or Math Elective (See list below.)**	3-5
CHEM 120	College Chemistry I	3
CHEM 121	Chemistry I Lab	2
GEOL 111	The Earth	3
GEOL 113	The Earth Lab	1
TOTALS	**Credit Hours**	**32**

**Students are required to complete one set of Science or Math Electives.

CE Technical Electives		
Course	**Course Title**	**Hrs.**
CE 300	Floodplain Management	3
~~CE 301~~	~~Field Experience in Floodplain Management~~	~~3~~
~~CE 326~~	~~Engineering Law~~	~~3~~
~~CE 360~~	~~Est., Scheduling Bidding~~	~~3~~
~~CE 361~~	~~Estimating Lab~~	~~1~~
CE 378	Boundary Surveying	3
CE 379	Boundary Surveying. Lab	1
CE 380	Route Surveying	3
CE 381	Route Surveying Lab	1
CE 383	Structural Steel Design	3
CE 426	Adv. Construction Matls.	3
CE 432	Traffic Engineering	
~~CE 436~~	~~Design / Constr. Integration~~	~~3~~
CE 440	Masonry Construction	3
CE 444	Bridge Engineering	3
CE 462	Hydraulic Engineering	3
CE 474	Civil Eng. Design Project	1-3
CE 475	Sel. Topics in Civil Eng.	3
~~CE 476~~	~~Highway Construction~~	~~3~~
~~CE 486~~	~~Steel & Concrete Constr.~~	~~3~~
~~CE 490~~	~~UK-CE Sel. Topics (Fall)~~	~~3~~
~~CE 491~~	~~UK-CE Sel. Topics (Spr)~~	~~3~~
AMS 305	Building Codes	3
AMS 325	Surv. of Building Systems	3
CM 363	Constr. Est. and Bidding	3
CM 400	Constr. Administration	3
CM 426	Construction Law	3
~~EE 350~~	~~Fund. of Electrical Eng.~~	~~4~~

EM 313	Dynamics	3
ENGR 400	Systems Engineering	3
GISC 316	Fundamentals of GIS	4
~~GEOL 308~~	~~Structural Geology~~	~~4~~
GEOL 310	Global Hydrology	3
GEOL 415	Environmental Geology	3
GISC 317	Geog. Info. Systems	4
ME 220	Eng. Thermodynamics	3
MATH 350	Adv. Engineering Math	3

CE Program:

Students must have a grade of "C" or better in:

- All premajor courses,
- All math courses,
- Science or math elective,
- EM 303 Mechanics of Deformable Solids,
- All CE courses including technical electives (except for one (1) 300-level or 400-level CE course),

Civil Engineering

Ogden College of Science and Engineering
Western Kentucky University

A Suggested Four-Year Academic Degree Path

FIRST YEAR			
FALL SEMESTER		**SPRING SEMESTER**	
CE176: CE Freshman Design	1	COMM145: Public Speaking	3
AMS163: Architectural Drafting	3	CE160/161: Surveying I and Lab	3/1
MATH136: Calculus I	4	MATH137: Calculus II	4
GEOL 111/113: The Earth and Lab	3/1	PHYS255/256: Physics I and Lab	4/1
ENG100: Intro to College Writing	3		
TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**16**

SECOND YEAR			
FALL SEMESTER		**SPRING SEMESTER**	
CE303: Construction Mgmt.	3	CE310: Strength of Materials Lab	1
ENG200: Intro to Literature	3	EM303: Mechanics of Deformable Solids	3
MATH237: Multivariable Calculus	4	MATH331: Differential Equations	3
EM222: Statics	3	Science or Math Elective	3
Arts and Humanities Elective	3	CE 332: Transportation Engineering	3
		CE 316: Equipment and Methods	3
TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**16**

THIRD YEAR			
FALL SEMESTER		**SPRING SEMESTER**	
CE382: Structural Analysis	3	CE305: Risk Analysis	3
CE410/411: Soil Mechanics and Lab	3/1	CHEM120/121: College Chemistry I and Lab	3/2
CE342: Fluid Thermal Science	4	CE412: Foundation Engineering	3
CE370/371:Materials of Const. and Lab	2/1	CE384: Reinforced Concrete	3
ENG300: Writing in Discipline Elective	3	CE Technical Elective	3
TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**17**

FOURTH YEAR			
FALL SEMESTER		**SPRING SEMESTER**	
CE352: Intro to Environmental Engineering	3	Connections: Social and Cultural Elective	3
CE Technical Elective	3	CE Technical Elective	3
ENGR490: Senior Design Seminar	2	CE498: Senior Project	3
Social and Behavioral Science Elective	3	Connections: Local to Global	3
HIST101 or 102: World History	3	CE461: Hydrology	3
Connections: Systems Elective	3		
TOTAL CREDIT HOURS	**17**	**TOTAL CREDIT HOURS**	**15**

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

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Phone:	270-745-2322