

Colonnade Program Course Proposal: Explorations Category

Please complete the following and return electronically to colonnadeplan@wku.edu.

1. What course does the department plan to offer in Explorations? Which subcategory are you proposing for this course? (Arts and Humanities; Social and Behavioral Sciences; Natural and Physical Sciences)

The Department of Geography and Geology plans to offer the existing GEOG 280: Environmental Science and Sustainability in the Natural and Physical Sciences subcategory within the Explorations Category.

This course represents a course under the existing Category D of the general education requirements. The course number is the same, but the course title is changing from Introduction to Environmental Science, and the credit hours are changing from 3 to 4 hours. This title change reflects a broadening of the course topics based on faculty expertise and growing needs of environmental science students post-graduation. The additional credit hour will give more time in the classroom for hands-on laboratory-based activities. Paperwork is currently in the course changes approval process and will be submitted to the University Curriculum Committee in February.

The Department of Geography and Geology also offers GEOG/GEOL 103: Our Dynamic Planet under the Natural and Physical Sciences subcategory within the Explorations Category. However, the course proposed herein (GEOG 280) covers a different set of science topics and aims to teach different scientific skills. Specifically, the GEOG/GEOL 103 course covers topics specific to Earth's physical processes and systems (i.e. air, water, weather, climate, tectonics, and landforms), whereas GEOG 280 briefly reviews a selection of these topics and also covers ecosystems, human-environmental interactions, and the principles of sustainability. Thus, topics such as soils and food production, ecosystem classification, species interactions, water resources, environmental evaluation, natural resources, and energy production, amongst others. These topics are not covered in the GEOG/GEOL 103 course, yet are also important science concepts for students to learn, as these natural science concepts can apply to students from any background within all aspects of their academic, professional, and personal lives.

2. How will this course meet the specific learning objectives of the appropriate subcategory? Please address all of the learning outcomes listed for the appropriate subcategory.

Environmental concerns pose growing challenges to how humans interact with the Earth. The course objective of GEOG 280 is to introduce students to the study of environmental issues and how their interrelationships with environmental systems can help either sustain or degrade these systems. It is the foundation upon which students begin to engage in environmental studies (policy and science) in the Department of

Geography and Geology. GEOG 280 is a required introductory course for certain majors and minors in the Department of Geography and Geology, but historically, approximately 70% of students have been non-majors. Individual course objectives are outlined under the Colonnade Learning Objective each one meets.

Colonnade Learning Objective 1: Demonstrate an understanding of the methods of science inquiry.

- Show an understanding of the scientific method and knowledge of natural science and its relevance in our lives.
- Calculate and evaluate ecological health indices
- Read and interpret climate change graphs
- Utilize standard environmental science techniques for evaluating the environmental condition of a given landscape.
- Describe the role of natural and human-induced factors influencing climate change and discuss the key scientific issues associated with interpreting climate-related data.

Colonnade Learning Objective 2: Explain basic concepts and principles in one or more of the sciences.

- Describe how environmental science assesses the state of the planet, and explain how the three unifying themes (sound science, sustainability, and stewardship) can help move us toward a sustainable future.
- Describe the difference between sustainability and environmental science, and how these two principles are related.
- Explain the three “E’s” of sustainability, with the goal that students be able to propose applications that are relevant, both locally and globally, to their lives in the 21st century.
- Describe the seven contemporary environmental conditions and problems driving the environmental science discipline.
- Discuss and describe the functions of the seven categories of ecological systems and their interrelations.
- Describe the organization of ecosystems, their responses to disturbance, their distribution across the planet, and how they are affected by humans.
- Categorize landscapes into one of the ecological system categories by evaluate their characteristics (i.e. animal and plant life presence, weather, water profile, interspecies interactions)
- Discuss interspecies and intraspecies interactions.
- Explain the differences between groundwater and surface water systems and their interrelationships.
- Explain the formation of air pollution and smog.
- Classify the major categories of pollution and describe the implications for environmental systems
- Explain the difference between climate change and weather.
- Describe the major water pollutant categories

- Discuss natural and human-induced factors influencing climate change by explaining the evidence behind climate change science.
- Describe the three main categories of energy resources (renewable, non-renewable fossil fuel, nuclear) including their differences, similarities, pros/cons

Colonnade Learning Objective 3: Apply scientific principles to interpret and make predictions in one or more of the sciences.

- Describe the role of natural and human-induced factors influencing climate change and discuss the key scientific issues associated with interpreting climate-related data.
- Explain the interrelationship between food production inputs (i.e. soils, fertilizers, climate, water) and outputs (i.e. crop yield, environmental degradation).
- Describe the role of sustainability practices and principles in the balancing present and future needs.

Colonnade Learning Objective 4: Explain how scientific principles relate to issues of personal and/or public importance

- Outline the contemporary trends in human population and development, and draw conclusions with respect to implications for future environmental change.
- Describe the role of human-induced factors influencing climate change.
- Explain the interrelationship between food production inputs (i.e. soils, fertilizers, climate, water) and outputs (i.e. crop yield, environmental degradation).
- Describe the role of sustainability practices and principles in the balancing present and future human and ecological needs.
- Describe the three main categories of energy resources (renewable, non-renewable fossil fuel, nuclear) including their differences, similarities, pros/cons
- Explain the three “E’s” of sustainability, with the goal of proposing applications that are relevant, both locally and globally, to their lives in the 21st century.

3. Syllabus statement of learning outcomes for course. NOTE: In multi-section courses, the same statement of learning outcomes must appear on every section’s syllabus.

The following items will appear in all GEOG 280 syllabi:

Course description: GEOG 280: Environmental Science and Sustainability will introduce the study of environmental science and the role of the interrelationship between humans and their environment in contemporary ecological issues. Specifically, students will gain a general understanding of the basic principles of environmental science, functions of ecological systems, contemporary environmental conditions and problems, techniques for investigating ecological systems, and theories on humanity’s place in the world’s ecosystems.

This course fulfills the Colonnade Program's requirements for the Natural and Physical Sciences subcategory of the Explorations Category. As part of that program, students in GEOG 280 will demonstrate the ability to:

1. Demonstrate an understanding of the methods of science inquiry.
2. Explain basic concepts and principles in one or more of the sciences.
3. Apply scientific principles to interpret and make predictions in one or more of the sciences.
4. Explain how scientific principles relate to issues of personal and/or public importance

The course objectives for GEOG 280 are designed to integrate fully with the Colonnade Program. Upon successfully completing GEOG 280, you will be able to:

- Describe how environmental science assesses the state of the planet, and explain how the three unifying themes (sound science, sustainability, and stewardship) can help move us toward a sustainable future.
- Describe the difference between sustainability and environmental science, and how these two principles are related.
- Describe the seven contemporary environmental conditions and problems driving the environmental science discipline.
- Discuss and describe the functions of the seven categories of ecological systems and their interrelations.
- Describe the organization of ecosystems, their responses to disturbance, their distribution across the planet, and how they are affected by humans.
- Categorize landscapes into one of the ecological system categories by evaluate their characteristics (i.e. animal and plant life presence, weather, water profile, interspecies interactions)
- Discuss interspecies and intraspecies interactions.
- Explain the differences between groundwater and surface water systems and their interrelationships.
- Explain the formation of air pollution and smog.
- Classify the major categories of pollution and describe the implications for environmental systems
- Explain the difference between climate change and weather
- Describe the major water pollutant categories
- Describe the three main categories of energy resources (renewable, non-renewable fossil fuel, nuclear) including their differences, similarities, pros/cons
- Outline the contemporary trends in human population and development, and draw conclusions with respect to implications for future environmental change.
- Explain the interrelationship between food production inputs (i.e. soils, fertilizers, climate, water) and outputs (i.e. crop yield, environmental degradation).
- Explain the three "E's" of sustainability, with the goal of proposing applications that are relevant, both locally and globally, to their lives in the 21st century.

- Describe how natural and human-induced factors influence climate change and discuss the key scientific issues associated with interpreting climate-related data, by explaining the evidence behind climate change science.
- Describe the role of sustainability practices and principles in the balancing present and future needs.
- Show an understanding of the scientific method and knowledge of natural science and its relevance in our lives.
- Calculate and evaluate ecological health indices
- Utilize standard environmental science techniques for evaluating the environmental condition of a given landscape.

4. Brief description of how the department will assess the course for these learning objectives.

The Department of Geography and Geology will assess GEOG 280 with pre- and post-test assessment tools that quantify student improvement in understanding concepts related to learning objectives. Students will be given the pre-test survey during the first two weeks of the semester prior to any appreciable content learning. The post-test survey will be given in the final two weeks of the semester prior to finals week. The pre- and post-test assessment tools consist of a number of questions related to learning objectives gathered. The questions in the assessment tool will be drawn and adapted from the Geoscience Concept Inventory and the Victorian Curriculum and Assessment Environmental Science Database. The Victorian Curriculum and Assessment Authority, a department of the Australian national government, is the most comprehensive, validated assessment test bank specific to the environmental science discipline, and is therefore the most suitable resources for assessing the course for the aforementioned learning objectives. Both of these assessment resources contain questions validated using standard item analysis techniques (Libarkin and Anderson 2005; Victorian Curriculum and Assessment Authority, 2013).

Results from the GCI assessments will be used to evaluate whether or not student learning objectives are being achieved. Results will be used to improve content and application teaching methods in the classroom.

Libarkin, J.C., and S. W. Anderson. 2005. Assessment of learning in entry-level geoscience courses: Results from the Geoscience Concept Inventory. *Journal of Geoscience Education*, **53**:394–401.

Victorian Curriculum and Assessment Authority. 2013. Environmental Science Exams and Examination Reports. Accessed 27 January 2014 at <http://www.vcaa.vic.edu.au/Pages/vce/studies/envscience/exams.aspx>.

Students will be pre- and post-tested on their understanding of the four objectives for this subcategory of the colonnade program. More specifically,

For Learning Objective 1 the assessment given to students will include questions on their understanding of the methods of science inquiry on such topics as the steps of the scientific

method, identifying sound science from hunk science, interpreting graphics and other data visualizations related to climate change and ecology, creating ecological indices, and assessing environmental conditions. An example question is:

Which of the following best illustrates sound science?

- asking voters to determine if windmills should be placed in their community
- measuring wind velocities to determine the cost-effectiveness of windmills in a region
- selecting a source of energy based upon the maximum yield of tax dollars
- lobbying government officials to increase drilling for offshore oil

For Learning Objective 2 the assessment given to students will include questions to test their basic understanding of concepts and principles in environmental science, ecology, geology, physical geography, and meteorology, among others. Such topics will include ecological identification, global climate change, surface and groundwater, the water cycle, formation of air pollution and smog. Example questions include:

Golden frog populations would be more likely to survive the current threats if

- their populations were more widely distributed across Central and South America.
- their populations were smaller in size.
- individuals were very similar to each other.
- they only fed on a single type of food.

For Learning Objective 3 the assessment given to students will include questions evaluating their ability to apply scientific principles to interpret and make predictions in the sciences by examining such topics as environmental health based on existing data, projected global climate change from paleoclimate reconstructions, and natural and human-induced ecological change. An example question topic is:

A grasshopper population in a prairie is limited in large part by the number of birds in the region. Following a terrible storm that killed many of the birds, the grasshopper population exhibits exponential growth. This happens because the grasshoppers experienced

- a new biotic potential with steady environmental resistance.
- a new biotic potential with decreased environmental resistance.
- a steady biotic potential but decreased environmental resistance.
- a decreased biotic potential and decreased environmental resistance.

For Learning Objective 4 the assessment given to students will include questions on such topics as how sustainability concepts can be applied in institutional and personal affairs, the importance of biological diversity on environmental health, impact of air and waste pollution on human health, relation of global climate change to environmental and human well-being and economic stability. An example question includes:

Which of the following best illustrates stewardship?

- lobbying government officials to increase the drilling for offshore oil
- selecting a source of energy based upon the maximum yield of tax dollars
- converting automobiles from gasoline to natural gas as a new source of fuel
- promoting the recycling of paper and aluminum on university campuses

The pre and post assessments will be evaluated on a pass/fail premise. Each student in the GEOG 280 courses for the entirety of the semester will complete the assessments (completed pre-assessments from students who withdraw from the course before the conclusion of the class will

be throw out since no post-assessment can be collected). On the assessment, 70% or above will be considered a passing grade. The department will use the pre and post assessments to establish the percentage of students whose understanding of the learning objectives was changed from the beginning to the end of the course, and the level of change. This will allow the department to identify if the learning objectives for the colonnade program are being met, and if not will highlight areas that need for attention in forthcoming semesters. Techniques for presenting material may also be changed if it is discovered that learning objectives aren't being met with existing strategies.

5. How many sections of this course will your department offer each semester?

The Department of Geography and Geology will offer a minimum of 1 section of GEOG 280 each academic year with a goal of enrolling 40 students per semester. As enrollment increases, 1 section per semester will be offered, with the same student size target.

6. Please attach sample syllabus for the course. PLEASE BE SURE THE PROPOSAL FORM AND THE SYLLABUS ARE IN THE SAME DOCUMENT.

See Below

GEOG 280 Environmental Science and Sustainability

Tentative Course Syllabus

Fall 2014

Monday/Wednesday 12:45-2:05pm, EST 337

Instructor: Dr. Leslie A. North

E-mail: Leslie.north@wku.edu

Office Location: EST 438A (4th Floor Environmental Sciences and Technology Building)

Office Phone: 270-745-5982

Office Hours: Wednesdays 10:00am-12:00pm and 3:00-4:30pm (or by appointment)

Course Description and Learning Objectives:

GEOG 280: Environmental Science and Sustainability will introduce the study of environmental science and the role of the interrelationship between humans and their environment in contemporary ecological issues. Specifically, students will gain a general understanding of the basic principles of environmental science, functions of ecological systems, contemporary environmental conditions and problems, techniques for investigating ecological systems, and theories on humanity's place in the world's ecosystems.

This course fulfills the Colonnade Program's requirements for the Natural and Physical Sciences subcategory of the Explorations Category. As part of that program, students in GEOG 280 will demonstrate the ability to:

1. Demonstrate an understanding of the methods of science inquiry.
2. Explain basic concepts and principles in one or more of the sciences.
3. Apply scientific principles to interpret and make predictions in one or more of the sciences.
4. Explain how scientific principles relate to issues of personal and/or public importance

The course objectives for GEOG 280 are designed to integrate fully with the Colonnade Program. Upon successfully completing GEOG 280, you will be able to:

- Describe the difference between sustainability and environmental science, and how these two principles are related.
- Describe the seven contemporary environmental conditions and problems driving the environmental science discipline.
- Discuss and describe the functions of the seven categories of ecological systems and their interrelations.

- Categorize landscapes into one of the ecological system categories by evaluate their characteristics (i.e. animal and plant life presence, weather, water profile, interspecies interactions)
- Discuss interspecies and intraspecies interactions.
- Explain the differences between groundwater and surface water systems and their interrelationships
- Classify the major categories of pollution and describe the implications for environmental systems
- Explain the difference between climate change and weather
- Describe the major water pollutant categories
- Describe the three main categories of energy resources (renewable, non-renewable fossil fuel, nuclear) including their differences, similarities, pros/cons
- Outline the contemporary trends in human population and development, and draw conclusions with respect to implications for future environmental change.
- Explain the interrelationship between food production inputs (i.e. soils, fertilizers, climate, water) and outputs (i.e. crop yield, environmental degradation).
- Explain the three “E’s” of sustainability, with the goal of proposing applications that are relevant, both locally and globally, to their lives in the 21st century.
- Describe how natural and human-induced factors influence climate change, and discuss the key scientific issues associated with interpreting climate-related data.
- Describe the role of sustainability practices and principles in the balancing present and future needs.
- Show an understanding of the scientific method and knowledge of natural science and its relevance in our lives.
- Calculate and evaluate ecological health indices
- Utilize standard environmental science techniques for evaluating the environmental condition of a given landscape.

Required Text: Wright, R. and Boorse, D. 2013. Environmental Science: Toward A Sustainable Future. Pearson.

Electronics: Except as made clear by the instructor, no electronic equipment (cell phone, iPads, Laptops, etc.) is allowed to be turned on in the classroom during the class period. If electronic equipment is used points will be deducted from the class attendance and participation grade.

Grading: GEOG 280 is a critical component of the WKU Department of Geography and Geology undergraduate program (environmental concentration). Expectations of students are high. Students will be evaluated in the following areas with the associated

point allocations. A standard 10-point grading scale (90-100=A, 80-89=B, etc.) will be used. To calculate your grade, total your points and divide by the total available points. Multiple by 100.

Instructions for each assignment will be provided in class and/or on Blackboard during the semester. Quizzes may be announced or unannounced. Due dates will be assigned when assignment instructions are distributed.

Lab Activities and Assignments (In-class and Out)	250
3 Topical Exams (points per exam)	100
Miscellaneous Writing Assignments and Activities	100
Quizzes	50
Classroom Attendance and Participation	100
Final Exam	200
Total: 1,000	

Blackboard: The use of Blackboard is required in this course. If you have any problems, read and follow the instructions on the Blackboard main page (blackboard.wku.edu). Blackboard will be used to support class content and discussion, as well as make assignments and supplementary course readings available. Your grade will be provided through Blackboard. In short, you are expected to fully and effectively use the Blackboard course site.

Grades of Incomplete (X) will only be assigned if all but a small portion of the coursework is left incomplete by the student and the inability to complete the course is due to circumstances beyond the control of the student. An "X" will be given **at the instructor's discretion**.

Late and Missed Assignments will be accepted at the instructors' discretion. If a late assignment is accepted the equivalent of a full letter grade will be deducted each day. If the university cancels classes, students are expected to continue with readings and assignments as originally scheduled unless other instructions are posted by the instructor. If you miss class on a quiz day, a makeup quiz will only be given with an excused absence at the discretion of the instructor. You must inform the instructor of an absence, **PRIOR** to the start of class on the absence day.

Class Attendance and Active/Meaningful Participation in all class meetings and activities are mandatory for this course. Unexcused absences merit a failing grade unless an excused absence is granted **PRIOR** to the beginning of the class/activity.

Schedule Change Policy: The Department of Geography and Geology strictly adheres to University policies, procedures, and deadlines regarding student schedule changes. It is the sole responsibility of the student to meet all deadlines in regard to adding, dropping, or changing the status of a course. Only in exceptional cases will a deadline be waived. The Student Schedule form requires a written description of the extenuating circumstances involved and the attachment of appropriate documentation. Poor academic performance, general malaise, or undocumented general stress factors are not considered as legitimate circumstances.

Student Disability Services: In compliance with university policy, students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services in Downing University Center A-200. The OFSDS telephone number is (270)745-5004; TTY is (270)745-3030. Per university policy, please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

Academic Integrity/Plagiarism: Cheating and plagiarism of any kind will absolutely not be tolerated. WKU adheres to a strict policy against plagiarism and cheating (see Scholastic Dishonesty Code in your Handbook). Academic dishonesty of any type will not be tolerated and appropriate penalties will be faced by anyone who violates this policy. Student work may be checked using plagiarism detection software. All academic work of a student must be his/her own. One must give any author credit for source material borrowed. To lift content directly from a source without giving credit is a flagrant act. To present a borrowed passage without reference to the source after having changed a few words is also plagiarism. Other examples of academic dishonesty include, but are not allowing other students to copy your work, using work from previous semesters, and plagiarism.

The Learning Center: Should you require academic assistance with your WKU courses, The Learning Center (located in the Downing Student Union, A330) provides free supplemental education programs for all currently enrolled WKU students. TLC @ Downing Student Union and TLC @ FAC offers certified, one-on-one tutoring in over 200 subjects and eight academic skill areas by appointment or walk in. Online tutoring is offered to distance learners. TLC is also a quiet study area (with side rooms designated for peer-to-peer tutoring) and offers a thirty-two machine Dell computer lab to complete academic coursework. Additionally, TLC has four satellite locations. Each satellite location is a quiet study center and is equipped with a small computer lab. These satellite locations are located in FAC, Douglas Keen Hall, McCormack Hall, and

Pearce Ford Tower. Please contact TLC @ Downing Student Union for more information or to schedule a tutoring appointment. (270) 745-6254.