

## GENERAL EDUCATION “LINKED” COURSES: BACKGROUND INFORMATION

The recently implemented revisions to Penn State’s undergraduate General Education program include a requirement that students take 6 credits of “Integrative Studies” courses. The distinguishing characteristic of these courses is that they are designed to foster “integrative thinking”—that is, “the ability to synthesize knowledge across multiple domains, modes of inquiry, historical periods, and perspectives, as well as the ability to identify linkages between existing knowledge and new information. Individuals who engage in integrative thinking are able to transfer knowledge within and beyond their current contexts.”

There are two categories of Integrative Studies courses: “Inter-domain” and “Linked.”

An inter-domain course is a single, stand-alone course that draws upon curricula from two different knowledge domains, integrating the curricula so as to make explicit “connections between knowledge areas.”

A linked course, on the other hand, always involves (at least) two courses, “usually linked by subject matter, but they should be linked by some purposeful component that provides opportunities for students to experience and practice integrative thinking across Knowledge Domains.” In addition, the “Linkage component between courses needs to be intentional and explicit to students. However, each course in a Linkage must be self-contained such that students can successfully complete just one course in the Linkage if they so choose.”

Penn State is counting on faculty to engage in a reflective process, considering how to foster integrative thinking within our General Education courses. We are asking faculty to be creative, to think of the various aspects of courses and curricula with which we are most familiar, and how such curricula might be linked to other disciplines and domains.

## INFORMATION FOR PROSPECTIVE PROPOSERS OF “LINKED” COURSES:

Steps involved in the preparation of “linked” course proposals can be accomplished several different ways. Let’s start with the simplest way: Identify two existing general education courses with the “linked” potential. This will customarily involve one faculty member (or group) taking the initiative and reaching out to another faculty member (or group) in a different department or College. **Establishing a collaborative agreement to submit the two courses as a pair of linked proposals is a necessary precondition to beginning work.**

If these two courses have not already been re-certified, then **the first step is to submit the existing general education courses for recertification.**

We'd suggest that each faculty member (or group) prepare and submit a "change" proposal for the existing general education course—this is the submission path for course re-certification.

Even if there are no planned changes in the existing general education courses, faculty are required to submit these recertification proposals under the category of "change."

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Once you have your recertification proposals underway, you can then turn your attention to developing and submitting your linked-course proposals, which will be categorized as "new" courses.

These courses will be submitted as "new" course proposals. Normally, they will carry the same course numbers as the re-certified courses, with the addition of a Z suffix.

The key distinction between the two re-certified courses and the two linked courses is the inclusion of a curricular link that is shared within both "Z" courses. Most often, this will entail slight modifications of each of the Z-course's curricular content. The point is to make evident what the curricular link is between the two Z-linked courses.

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It is also possible to design three Z-linked courses; that is, three Z-courses that all share the same curricular link. It's worth noting, though, that such an arrangement actually establishes three "pairs" of Z-linked courses. Students would customarily choose two of the three courses to satisfy the six-credit Integrative Studies requirement.

Even more complex "linked" course configurations are possible (but extremely rare).

It's also quite possible to create a new course, or two new courses, each as part of a "linked" pair (or group) of courses. This would obviously entail a great deal more work than would be required to "convert" two existing general education courses into a "linked" pair. This is an opportunity, though, for faculty to reflect on the courses and curricula within their own areas of expertise, to consider connections, to reach out to colleagues in other departments and colleges, to collaborate, and to innovate.

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### **COMPLETING A LINKED COURSE PROPOSAL:**

Learning to navigate within the CRCS system involves a certain amount of trial and error. The good news is that the system is robust and will withstand almost any entry efforts. More important than the logistics of system navigation and input, though, is the substance and quality of the proposal, which will be evaluated by faculty colleagues, including those you select for faculty consultation, as well as college administrators and members of the Faculty Senate.

The most substantive and detailed information that is needed to complete the linked course proposal can be broken down into three major areas: Course Overview, General Education Domain Requirements, and General Education Integrative Studies Requirements.

As you read through this section of the Linked Courses Discussion Paper, you may want to have this sample linked course proposal open in an adjacent tab:

<https://gened.psu.edu/sites/default/files/docs/GENED%20100Z%20-%20Sample.pdf>

### **Course Overview**

The Course Overview section of the proposal requires a basic outline of the proposed course with specific questions that relate to the major topics to be covered, the course objectives/learning outcomes, and how these objectives/learning outcomes will be assessed. Coming to the symposium with the following items will help in the timely completion of this section of the proposal.

1. A list of major course topics.
2. A list of course objectives/learning outcomes.
3. A basic outline of how learning objectives/outcomes will be assessed. Specific assignments/assessments are not required, but a description of the types of the assessments to be used and how they assess the learning objectives is required.

### **General Education and Domain Requirements**

The General Education and Domain Requirements section is used to make sure that the course fulfills the requirements to be designated a General Education course within the domain of each course in the linked pair. This section is focused on achievement and assessment of General Education learning objectives and domain-specific criteria ( <https://gened.psu.edu/updated-learning-objectives-and-foundation-and-domain-criteria> ).

Completion of this section of the proposal will be expedited by:

1. Selecting 2-3 General Education learning objectives and describing how they will be achieved and assessed.
2. Describing what components of the course will help students achieve the domain criteria.

### **General Education Integrative Studies Requirements – Linked Course**

The General Education Integrative Studies section of the proposal requires a description of how a pair of linked courses will develop students' integrative thinking. This section of the proposal requires clear explanations of:

1. How the intellectual frameworks and methodologies of each course's Knowledge Domain will be explicitly addressed in the course and practiced by the students.
2. How the courses in the Linkage will be linked with each other. The linkage should include a "purposeful component that provides opportunities for students to experience and practice integrative thinking across Knowledge Domains" and should be "intentional and explicit to students." However, each course in a Linkage must be self-contained such that students can successfully complete just one course in the Linkage if they so choose.
3. How assessments will be used to determine students' ability to apply integrative thinking.

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### **ESPECIALLY USEFUL GENERAL EDUCATION LINKS:**

The Office for General Education has a lot of helpful information. The following are ones we think will be especially useful:

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Office for General Education:

<https://gened.psu.edu/> [Embedded links, per indentations:]

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Click "Faculty / Staff":

<https://gened.psu.edu/about-general-education>

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Click "About General Education":

<https://gened.psu.edu/about-general-education>

NOTE: Updated Learning Objectives and Foundation and Domain Criteria  
NOTE: Updated Requirements for Students (starting summer 2018)

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Click “Integrative Studies Courses”:

<https://gened.psu.edu/integrative-studies-courses>

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Click “Recertification Process”:

<https://gened.psu.edu/recertification-process-general-education-courses>

NOTE: Recertification Process FAQ’s

NOTE: Sample Course Recertification Proposal

NOTE: Instructions for Proposal to Change a Course

NOTE: Course Proposal Job Aid (Word Document)

NOTE: Course Proposal System

NOTE: Curriculum Archive

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### **EXAMPLES OF LINKED COURSES:**

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Example 1: (Approved)

INART 50Z, The Science of Music (GN)

MUSIC 11Z, Under the Hood: How Classical Music Works (GA)

**Explain how the intellectual frameworks and methodologies of each course's Knowledge Domain will be explicitly addressed in the course and practiced by the students.**

In MUSIC 011Z, open forums provide students great latitude and are like classroom discussions. On the discussion boards, the group of students who are assigned to that board will select from a list of topics for their initial posts, and respond to two or three of their groupmates' initial posts. For the concert review assignment, students choose to attend a performance, selecting from a list of professional performances provided for that semester. For the final reflection paper, students are invited to reflect on the experience of studying classical music in the course, to consider what they have learned, cite notable composers and compositions, and consider the value of the experience. In each case, the instructor is assessing the substance and quality of the student's writing, with an eye for the student's demonstration of effective communication, critical "reading" of musical materials and performance, and critical and analytical thinking.

In INART 050Z, students are trained in a variety of problem solving tasks, involving the synthesis of math, acoustics, and music. Students apply skills such as using trigonometric functions to plot waveforms in a spreadsheet; understanding graphs of sound spectra, room absorption coefficients, and the like; understanding the mathematical basis of musical scales; and analyzing spectrograms of musical instruments. Examinations require that students relate concepts to each other that are covered throughout the course. Homework assignments are exercises meant to strengthen certain mental muscles (like calisthenics), while examinations require deeper conceptual understanding of linkages among course topics.

As a science course, the focus of INART 050Z is on problem solving, understanding how to derive correct solutions to problems when it is possible to do so, and understanding what aspects of musical perception cannot be explained through quantitative problem solving. As a science course, its methodologies are quantitative, based on a rational understanding of problems and their contexts, and the equations that describe these problems. As a science of music course, it exemplifies how quantitative understanding and mathematical skills can embody and lead to a greater appreciation of the sublime.

In MUSIC 011Z, students will be introduced to the scientific foundation of music making, explicitly examining elements relating to pitch frequency, arithmetic ratios between pitches, intervals, the natural harmonic series, and how these scientific elements underlie the creation of musical scales, tunings, and ultimately the development of the musical language of tonality.

**Explain how the courses in the Linkage will be linked with each other. It is anticipated that courses will usually be linked by subject matter, but they should additionally be linked by some purposeful component that provides opportunities for students to experience and practice integrative thinking across Knowledge Domains. The Linkage component between courses needs to be intentional and explicit to students. However, each course in a Linkage must be self-contained such that students can successfully complete just one course in the Linkage if they so choose.**

The two courses share a common foundation. Both rely on an understanding of vibrations, resonance, the natural harmonic series, the creation of musical scales, the nature of consonance and dissonance, the creation of musical scales, and an understanding of timbre and the differences between the instrument families. MUSIC 011Z takes this foundation into areas pertaining to the historical development of musical form and composition. INART 050Z takes this same foundation into areas of physical sciences, focusing on wave behavior, perception and cognition, and audio technologies. MUSIC 011Z is a historical overview of the development of an art form and its expressive capacities. INART 050Z is a quantitative overview of the physical and cognitive foundations that allow this art to exist in our world. MUSIC 011Z gives students a sense of what music has meant to people throughout history. INART 050Z gives students a sense of how music exemplifies physical phenomena of our universe, such as resonance and wave transmission. INART 050Z covers aspects of music that can be explained concretely and quantitatively. MUSIC 011Z covers aspects of music that are subjective and are understood intuitively. The two perspectives are complementary, and both are necessary for a meaningful understanding of how and why music has been vital and important to society and culture throughout history.

**Briefly explain the staffing plan. Given that each Linked course is approved for a single Knowledge Domain, it will be taught by an instructor (or instructional team) with appropriate expertise in that domain, who will also be expected to implement the Linkage's shared component as defined in this proposal**

INART 050Z will be taught by a specialist in music technology, a field that requires expertise in both the artistic elements of music creation and a scientific understanding of the physical properties of music. MUSIC 011Z will be taught by a music theorist, historian, or performer with appropriate expertise in theory, history, and performance. Mark Ballora is the original proposer and author of INART 050, and Stephen Hopkins is the original proposer and author of Music 011. The two have collaborated in the proposal of these linked courses, INART 050Z and MUSIC 011Z. Curricular elements that link the two courses have been incorporated in each proposal.

**Describe the assessments that will be used to determine students' ability to apply integrative thinking.**

In INART 050Z, students are guided through the physical foundations of music. Throughout the course, connections are made between the concrete nature of the physical sciences and the abstract nature of the fine arts. Musical examples are used throughout to explain topics such as tunings, the instrument families, and the nature of room acoustics, and how music written in different historical periods was written to suit the spaces in which it was performed (such as large cathedrals or small salons). The material is inherently integrative, and really needs no special effort to connect the scientific to the artistic. The homework assignments and tests, with their different approaches to the material (described above) ensure that students grasp the underlying nature of musical material.

In MUSIC 011Z, written assignments will include responses on open forums and assigned topics on discussion boards, both of which will allow students to respond to one another and to learn from one another. In addition, there are two papers submitted directly to the instructor. All of these written assignments will prompt students with suggested topics and questions that encourage students to apply integrative thinking and provide them opportunities to demonstrate their abilities in this regard. Given the interrelationships between the art of music and the science of music, there will be ample material with which the students engage that will demonstrate their ability to apply integrative thinking.

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Example 2: (Under Review) [Three Z-linked courses]

ART 144Z, Climate Change: Arts, Agency, and Activism (GA)  
 BIOL 144Z, Climate Change: Biological Impacts (GN)

## PSYCH 144Z, Climate Change: Individual Behaviors and Group Attitudes (GS)

### **Explain how the intellectual frameworks and methodologies of each course's Knowledge Domain will be explicitly addressed in the course and practiced by the students.**

ART 144Z will use an intellectual framework centered around the natural way artists see, learn, describe and communicate the world around them. Combining a research-based approach with a randomized system of juxtapositions with both imagery and words, will expose students to new ways of thinking and new possibilities in solving global problems, and here the most challenging problem of our time. Students will begin by communicating their basic competence in understanding climate change, they will be exposed to several ways of making art, and will then combine ideas and process. Throughout the semester students will build on their knowledge through interactive assignments, discussions reflections and art making. Thus, art making, research on artists, lectures about art and social change, discussions and critiques will deepen all aspects of the Art Knowledge Domain.

BIOL 144Z will help students to increase their abilities to meet of the GN domain criteria described. Throughout the course, students will learn about methods of inquiry in the natural sciences used to understand climate change and the biological impacts of climate change, and construct evidence-based explanations for climate change and the biological impacts of climate change. Students increase their ability to demonstrate understanding of scientific claims and their application through investigation of case studies of the impact of climate change on the biota from the individual to the ecosystem level. Emphasis on evaluation of scientific research by examining the quality of the data, methods, and inferences used to generate scientific knowledge will be key to the course for students to be able to form conclusions about the impacts of climate change and the societal implications of these discoveries.

PSYCH 144Z is intended to be an introduction to environmental attitudes and behavior research within the social sciences (GS), especially the fields of social and environmental psychology. This course allows students to understand the varied psychological processes, including individual attitudes, societal values, and personality traits, that shape a person's interactions with and feelings toward the physical environment within the context of global climate change. Drawing on methodology and theory in the areas of attitude change, social cognition, environmental perception, pro-social behavior, and emotions, this course will provide students with insight into how individual and group actions and mental processes can impact beliefs and actions toward global climate change while also providing a foundation for ways to alter those behaviors in meaningful ways.

### **Explain how the courses in the Linkage will be linked with each other. It is anticipated that courses will usually be linked by subject matter, but they should additionally be linked by some purposeful component that provides opportunities for students to experience and practice integrative thinking across Knowledge Domains. The Linkage component between courses needs to be intentional and explicit to students. However, each course in a Linkage must be self-contained such that students can successfully complete just one course in the Linkage if they so choose.**

The theme of climate change inherent in BIOL 144Z, ART 144Z, and PSYCH 144Z creates a natural linkage for these courses. In addition, intentional and explicit components to strengthen the linkages between these courses have been embedded in each course with particular emphasis on opportunities for students to experience and practice integrative thinking across Knowledge Domains.

#### **ART 144Z & BIOL 144Z**

ART 144Z will be explicitly linked with BIOL 144 Z by using scientific data throughout the semester to support art making in response to climate change. This data will be delivered in the form of readings, discussions and lectures. Students will respond to the information in discussions, journal entries and art making. Specific linkage to the biology course will occur in the lectures on biological impact. Students will create a collage assignment juxtaposing images of impacted populations, biology and ecosystems.

BIOL 144 Z will be explicitly linked with ART 144Z by presenting students artistic representations of climate change and environmental issues throughout the semester to initiate thought and research of biological issues related to climate change. For example, an image of an artistic piece by Ashley Cecil depicting the impacts of droughts on human food availability could be presented to students for their interpretation prior to discussing the impacts of climate change on agriculture and food for human populations in regions that will be impacted by more severe and frequent droughts.

#### **ART 144Z & PSYCH 144Z**

ART 144Z will be explicitly linked with PSYCH 144Z through activities and assignments that prompt students to integrate psychological understanding of how people process new information based on individual behaviors and societal attitudes into a public art work. Students will read an article on crafting normative messages to protect the environment, and discuss; they will then create a piece of art that uses the psychology of persuasion for change. They will use words cut from previous articles and pair them with one of the images they made previously in the semester to create new meaning. BIOL 144Z will be explicitly linked with PSYCH 144Z through activities and assignments that prompt students to integrate scientific information with the psychological understanding of how people process new information based on individual behaviors and societal attitudes. For example, after a brief introduction to confirmation bias students will be asked to infer the response of people to scientific information when they previously had strong beliefs that agreed with or contradicted the scientific conclusion.

PSYCH144Z will be explicitly linked with ART144Z through activities and assignments that require students to utilize social science research on messaging and persuasion into a critique of artistic rendering and exhibitions on climate change. Students will read research on emotional and informational appeals and then be presented with several artistic works on climate change along with the artists' description of the works. They will write a critique of the work, through the lens of a social scientist, that highlights the more or less effective elements of the work and explain contexts in which the work would be more or less well-

received by the audience.

#### BIOL 144Z & PSYCH 144Z

BIOL 144Z will be explicitly linked with PSYCH 144Z through activities and assignments that prompt students to integrate scientific information with the psychological understanding of how people process new information based on individual behaviors and societal attitudes. For example, after a brief introduction to confirmation bias students will be asked to infer the response of people to scientific information when they previously had strong beliefs that agreed with or contradicted the scientific conclusion.

PSYCH144Z will be explicitly linked to BIOL144Z through activities and assignments that prompt students to integrate their knowledge of individual and collective human behavior and attitudes with research in biology and ecology. For example, after reading an article on psychological processes related to empathy and concern for wildlife, students will be asked to apply that research to a specific species being impacted by climate change. Similarly, after reading articles on central and peripheral processing of information, students may be asked to create two different infographics—one central and one peripheral—for a scientific finding on climate change in ecology to aid in swaying public understanding of the data.

#### **Briefly explain the staffing plan. Given that each Linked course is approved for a single Knowledge Domain, it will be taught by an instructor (or instructional team) with appropriate expertise in that domain, who will also be expected to implement the Linkage's shared component as defined in this proposal**

ART 144Z will be taught by an instructor with artistic expertise who is capable of teaching both a multi-media studio class and art history, and also has some knowledge in regards to art activism and specifically climate change. This instructor also will be responsible for the explicit linkages to BIOL 144 Z and PSYCH 144Z as described above with consultation with instructors of BIOL 144 Z and PSYCH 144Z.

BIOL 144Z will be taught by an instructor with biological expertise that possesses knowledge of individual response to environment, population dynamics, community interactions among species, ecosystem processes, and basic processes influencing climate change. This instructor also will be responsible for the explicit linkages to ART 144Z and PSYCH 144Z as described above with consultation with instructors of ART 144Z and PSYCH 144Z.

PSYCH 144Z will be taught by an instructor with psychology expertise that possesses knowledge of individual and group biases, attitudes, and behavioral responses to climate change (i.e., social or environmental psychology). This instructor also will be responsible for the explicit linkages to ART 144Z and BIOL 144Z as described above with consultation with instructors of ART 144Z and BIOL 144Z.

#### **Describe the assessments that will be used to determine students' ability to apply integrative thinking.**

In ART 144Z, integrative thinking will be assessed through discussions, journal entries, projects and critiques and the final journal reflection. During critiques of the projects that are overtly targeted towards psychology and science, students will have used specific information presented in their art works, during the critiques of those works students would be required to articulate how they synthesized that information in the end product. Further, and more deeply, the final project will be a complete synthesis of all of the information they learned during the semester applied to a single area of climate change, for example they may choose melting polar ice, and create a project that communicates the science of either the actual melting or its impacts, and consider the audience in the making to better communicate their idea in materials, size, scope and/or placement.

In BIOL 144Z, integrative thinking will be assessed through exam questions, writings, and/or projects that prompt students to evaluating their scientific conclusions within the context of psychology and art. Assessments of integration of the natural and social sciences would ask students to communicate or explain how scientific conclusions may be interpreted differently based on the psychology of individual behavior and societal attitudes. Assessments of integration between art and science will take the form of prompts that ask students to draw scientific inspiration from art, leading students to formulate and research scientific questions and integrate their biological knowledge into their interpretation of the art. Assessment will employ a series of assignments throughout the semester that will be used to evaluate growth of integrative thinking over the duration of the course.

In PSYCH 144Z, integrative thinking will be assessed through exam questions, writings, and/or projects that prompt students to evaluating their scientific conclusions within the context of biology and art. Assessments of integration of the natural and social sciences would ask students to communicate or explain how scientific conclusions maybe interpreted differently based on the psychology of individual behavior and societal attitudes. Assessments of integration between art and psychology will take the form of prompts that ask students to utilize their psychological knowledge of individual and group attitudes, biases, and behaviors into their interpretation and critique of climate change art. Assessment will employ a series of assignments throughout the semester that will be used to evaluate growth of integrative thinking over the duration of the course.