IAI GECC Life Sciences Panel
Course Document Submission Guide

The panel uses a syllabus to assess whether a course meets the general education requirements. An example syllabus is provided at the end of this document. The panel does not require a syllabus to follow a particular format, however, the syllabus must include the following items:

1. Course title: E.g. Plants and Society

2. Prefix and number: E.g. BIO 100

3. Credit hours and contact hours:
- Credit hours and contact hours (for lecture and/or lab hours) should be clearly stated on the syllabus. Indicate if credit hours are based on semesters or quarters.
- The panel cannot approve a course in which there are insufficient contact hours or lab hours for the credit hours granted. For example, labs are typically around 30 contact hours per semester.

4. Syllabus recency:
- This informs the panel how recent the course materials are. The panel needs to see materials that are not more than 5 years old.

5. Prerequisites:
- The panel cannot approve a course that has a college-level life science course as a prerequisite, except for a lab course that is a companion to a GECC-approved lecture course with the same course code. High school biology or college chemistry are acceptable.
- Prerequisites should be included with departmental course information and full course titles as well as any IAI codes associated with the prerequisites.
- E.g. 0000 555 High School Biology, ENG 101 - Writing 1 - C1 901.
- If there is no prerequisite, state 'None'.

6. Catalog description:
- A catalog description is used to assess the general education requirements. The panel compares catalog description to course objectives, weekly topical outline, and the IAI descriptor to ensure consistency.

7. Learning outcomes:
- Learning outcomes should be stated within the syllabus or in a supplemental document.

8. Textbook and lab manual:
- Textbook and lab manual are examined for appropriateness. A course will not be rejected solely on the textbook, but it gives the panel some insight into the course.
- If open resources (OER) are used, the panel must be able to access them through a link that does not require login/password information.

9. Weekly (or detailed) topical LECTURE outline:

- A course must cover a breadth of foundational biology concepts including topics in molecular biology (Central Dogma, DNA replication, DNA transcription, gene expression), cellular biology, organismal biology including, structure/function, evolution, and ecology as appropriate to the specific IAI course descriptor. These topics must be clearly presented in the detailed topical outline.
- Placement of material within the semester (e.g. Week (or Unit) 1, week (or unit) 2, etc.).
- Each weekly topic is broken out into **detailed subtopics.**
- Detailed **description of lecture topics**. This is not the same as learning outcomes. (see sample syllabus at the end of this document).
- Methods of assessing student outcomes (e.g. Pre and post quizzes, lecture exams, lab exams, lab notebook, current event plant assignments, peer evaluation of notebook, field trip report, lab review assignments, etc.).
- Integrated science process skills and societal relevance of the scientific concepts should be interwoven throughout the lecture material. These components are commonly highlighted in the detailed topical outline in two ways (see the example syllabus).
- Highlight or otherwise label the **integrated science process skills** in each topic. Specific examples of integrated science process skills being evidenced throughout a course can be found in the example syllabus at the end of this document.
    - Panel members are looking for sufficient evidence of integrated science process skills as described here: https://narst.org/research-matters/science-process-skills
    - **"Basic" science process skills may not be considered as "integrated" science processing skills.**
    - Examples of integrated science process skills in lecture courses may include but are not limited to:
        - Examination, analysis, or discussion of authentic data sets.
        - Analysis and interpretation of graphs and other visual representations of data.
        - Reading and analyzing scientific investigations; identifying components of a scientific investigation by reading either primary literature itself or a summary from a reputable source (i.e. Science News).
        - Reading, analyzing, and discussion of the presentation of science topics in general media.
        - Identifying sound, unsound, or biased sources of science information in the media.
        - Working with authentic data sets.
    - In a lecture-only course, integrated science process skills should be included in at least **25%** of course topics.
    - In a stand-alone lab course, integrated science process skills should be included in at least **50%** of course topics or lab time.
    - In a combined lecture-lab course, integrated scientific process skills should be covered in at least 50% of the lab time in the lab portion and may optionally be covered in the lecture.
- Highlight or otherwise label the **societal/personal relevance** where applicable. Examples of societal relevance components being evidenced throughout the course can be found in the example syllabus at the end of this document.

- In a lecture-only course, the societal relevance component should be included in at least **25%** of course topics.
- In a lecture-lab course, the societal relevance component should be included in at least **25%** of course topics or lab time. It is acceptable to have the societal components in only the lecture portion of the course.

10. Weekly (or detailed) summary of each LAB activity:

- A lab course may not be approved if more than **25%** of the labs are comprised of non-lab and/or non-hands-on activities including "point-and-click-only" simulations, worksheets, coloring, movies/videos, discussions, guest speakers, field trips (not to be confused with field work), demonstrations, reviews, and exams in any combination.
- Panel members are looking for sufficient evidence of integrated science process skills as described here: https://narst.org/research-matters/science-process-skills
- **"Basic" science process skills may not be considered as "integrated" science processing skills.**
- In a lab course, students should be engaged in active, hands-on development of integrated science process skills in three broad areas:
  - Making observations, formulating hypotheses and predictions
    - Making scientific observations
    - Asking scientific questions
    - Developing hypotheses
    - Making predictions
  - Designing investigations and conducting experiments
    - Designing and conducting investigations
    - Identifying variables in experiments
    - Collecting authentic data from an investigation conducted by the students
  - Analyzing data and evaluating conclusions
    - Performing statistical analysis
    - Organizing and presenting data in tables and/or graphs
    - Drawing conclusions about hypotheses using data
    - Communicating about an investigation, results, and conclusions through written assignments or oral presentation
    - Critiquing an experimental design.
- The above activities from each of the three areas must be evident across **50%** or more of the lab portion of the course.

Syllabus Example

BIO 112
HUMAN BIOLOGY
Fall/Spring 20##
(*3 lecture hours; 2 lab hours)*

Required material:

Darwin, Charles. Human Biology 4e. 20##. Publishers Anonymous.
Lab Packet for Bio 112 (to be purchased at the college bookstore). Self-published.

Prerequisites:

MAT 097; ENG 098

Catalog description:

This laboratory course will expose students to the breadth of biological concepts by including evolution, cell and molecular biology, human genetics and heredity, human structure and function, and ecology. Evolution is a foundational concept that should be included in every biological sciences course. This general education course will emphasize the value and contributions of life science to society.

Weekly Topical Lecture Outline Examples:

Only the equivalent of three weeks of a sixteen week course is covered for purposes of this sample. Submitters will need to submit complete lecture coverage AND a brief description of EACH lab if it's a lab course.

WEEKLY LECTURE OUTLINE EXAMPLE #1
(A bad example and a very common mistake submitters make)

Week 1 - Introduction to Science
- Chapter 1

Week 2 - Evolution and Humans
- Chapter 2

Week 3 - Ecology and Humans
- Chapter 3

No one knows what these mean except the course instructor who is intimately familiar with the textbook. What topics does "Evolution and Humans" include? This is unacceptable as a weekly topical outline and a submission like this will be returned.

WEEKLY LECTURE OUTLINE EXAMPLE #2
(A good option to present lecture information)

Week 1 - Introduction to Science.

Societal relevance

- Identify the steps in the scientific method.
- Differentiate between integrated and basic scientific processes.
- Explain why falsifiability is important in science.
- Differentiate between science and pseudoscience.
- Identify at least three instances in American culture where an organization or individual claims to have scientific backing but is really false science and then explain why their claims may not be scientific.
- Correctly determine whether an hypothesis is accepted or rejected from an authentic data set in a scientific case scenario.

Week 2 - Evolution and Humans

- Describe how evolution is observed in populations and not individuals.
- Describe five mechanisms of evolution (natural selection, genetic drift, mutation, nonrandom mating, migration).
- Identify examples in society how an understanding of evolutionary principles improves medicine and agriculture.

Science process skills

- Describe the major evolutionary milestones that occurred among the hominins that contributed toward the emergence of modern humans.
- Describe the major competing hypotheses that best describe how modern humans relate to modern apes.
- During an in class simulation with white and black beans, students are to track allele frequency changes in a population with a selective mechanism acting on the individuals in a population. Students are to graph the change in allele frequencies over time for each allele.

Week 3 - Ecology and Humans

- List the major hierarchies of life as they pertain to ecology.
- Describe how biologists measure population size and structure.
- Explain what demography is.
- Describe what carrying capacity is and the major factors that may go into determining the carrying capacity of humans on our planet.
- Explain how societal factors can influence a country's population size and structure.
- Explain if a population is increasing, decreasing, or stabilized based on that population's age structure diagram.

Lab Descriptions Examples: (only the equivalent of three weeks of a sixteen week course is covered for purposes of this sample)

WEEKLY LAB SUMMARY EXAMPLE #1
(A bad example and a very common mistake submitters make)

Weekly Lab Schedule

- Week 1 - Scientific Method
- Week 2 - Human Evolution
- Week 3 - Size and Structure of Human Populations

This is a list of the lab topics but does not give any detail about what students will be doing during the lab time. This is not acceptable for a list of lab descriptions and will be returned.

WEEKLY LAB SUMMARY EXAMPLE #2
(A good option to present lecture information)

Lab 1 - The Scientific Method

Students generate a hypothesis regarding the relationship of exercise on heart rate and breathing rate. Students collect data regarding the effects of a type of exercise on heart rate and respiration. Students are to graph this data and formulate a conclusion regarding their hypothesis. Discussions occur regarding the controlling of variables, collecting data, graphing, and forming proper conclusions. Students also discuss the physiological benefits of exercise.

Lab 2 - Human Evolution

Students generate a hypothesis as to which of five hominin skulls is the most ancestral hominin species. Students qualitatively assess specific features of hominin skulls and rank them in evolutionary order. Specific features that are assessed may include: face/brain ratio, brow ridges, canines, foramen magnum, profile muzzle, chin, dental arcade, and jaw size. Students then formulate a conclusion based on the data they collected.

Lab 3 - Size & Structure of Human Population

Students work through an online activity that explores the challenges different countries face given their population size and structure. Students will observe authentic data from various countries. From this data they will construct age structure diagrams and compare diagrams from various countries and discuss the factors that may be contributing toward each country's diagram being different.