

Term Information

Effective Term Autumn 2024

General Information

Course Bulletin Listing/Subject Area Molecular Genetics
Fiscal Unit/Academic Org Molecular Genetics - D0340
College/Academic Group Arts and Sciences
Level/Career Undergraduate
Course Number/Catalog 1103
Course Title Plants & People: An Introduction to Plant Biology
Transcript Abbreviation Plants & People
Course Description Plants and their relationships to humans and the biosphere, how plants adapt to changing environments and are critical to a collective response to the changing climate, plant anatomy, plant cell biology, plant genetics, and plant biotechnology.
Semester Credit Hours/Units Fixed: 4

Offering Information

Length Of Course 14 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture, Recitation
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus, Lima, Mansfield, Marion, Newark, Wooster

Prerequisites and Exclusions

Prerequisites/Corequisites None
Exclusions Molgen 1101, Biology 1101, 1113, 1113H, 1114, 1114H
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 26.0804
Subsidy Level General Studies Course
Intended Rank Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

General Education course:
Biological Science; Natural Sciences

Course Details

Course goals or learning objectives/outcomes

- See attached syllabus

Content Topic List

- Plants in the modern world
 - Plants and climate change
 - Introduction to life
 - The plant cell
 - Plant structure and growth
 - Plant metabolism: photosynthesis
 - Plant nutrition
 - Plant flowering and reproduction
 - Mendelian genetics
 - Plant biotechnology

Sought Concurrence

No

Attachments

- Molgen_1103_GE Foundations_Syllabus.docx: Syllabus
(Syllabus. Owner: Cole, Susan Elizabeth)
- MG1103_ge-foundations-submission [92].pdf: GE foundations
(Other Supporting Documentation. Owner: Cole, Susan Elizabeth)
- Cover Letter for 1103 request.docx: Cover letter
(Cover Letter. Owner: Cole, Susan Elizabeth)

Comments

- The class is fundamentally based on the existing Molgen1101 class, but as we have decided to convert the experiential component from a standard lab to a recitation that includes active learning and discussions along with more limited lab experiences, we were requested to submit under a new number. Once this class is approved, MOLGEN1101 will be formally withdrawn and this class will be submitted for approval through the OT36.

As this class covers fundamentally the same content as the existing MOLGEN1101, no additional concurrences have been sought. *(by Cole, Susan Elizabeth on 01/05/2024 11:41 AM)*

COURSE REQUEST
1103 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette
Chantal
01/24/2024

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Cole, Susan Elizabeth	01/05/2024 11:41 AM	Submitted for Approval
Approved	Cole, Susan Elizabeth	01/05/2024 11:41 AM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	01/24/2024 12:37 PM	College Approval
Pending Approval	Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Neff, Jennifer Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	01/24/2024 12:37 PM	ASCCAO Approval



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January 5th, 2024

Dear Members of the ASCC,

The Department of Molecular Genetics is requesting the creation of a new course, to be titled "**MOLGEN 1103 Plants & People: An Introduction to Plant Biology**". This course will fulfill the requirements of the new General Education Foundation in Natural and Mathematical sciences, and will also serve as a 4-credit, non-lab course in the Legacy GE (NMS-Biological Sciences).

The class is fundamentally based on the existing Molgen1101 class, but as we have decided to convert the experiential component from a standard lab to a recitation that includes active learning and discussions along with more limited lab experiences, we were requested to submit under a new number. Once this class is approved, MOLGEN1101 will be formally withdrawn and this class will be submitted for approval through the OT36.

As this class covers fundamentally the same content as the existing MOLGEN1101, no additional concurrences have been sought.

Sincerely,

Susan Cole, Ph.D.
Professor and Vice Chair of Molecular Genetics

MOLGEN 1103 Plants & People: An Introduction to Plant Biology

Course information

Instructor:

- Iris Meier, Professor, Department of Molecular Genetics, College of Arts and Sciences
- Norman Groves, Postdoctoral Scholar, Department of Molecular Genetics, College of Arts and Sciences

Email: meier.56@osu.edu & groves.146@osu.edu

Credits: 4

Day and Time: Mon/Wed/Fri, 1 Hour Lecture. TBD, 2-hour recitation

Section: GE Foundations: Natural Sciences

Location: TBD

Prereqs: None

Course Description

This course is a 4-credit-hour lecture and recitation course focusing on the basic principles of plant biology. It is a survey course, covering plant anatomy, plant cell biology, plant genetics, and plant biotechnology. Students will be introduced to the scientific method and will practice formulating a hypothesis and testing it in an experiment. They will be introduced to the fundamental chemical foundations of all living organisms, to understanding the body plans of organisms, to the nature of all life's genetic material, and to the process of photosynthesis, the core energy conversion step that transforms inorganic carbon dioxide, water and minerals into living matter. Each week, a "Plants and people" lecture will lead up to the science covered during that week by illustrating its relevance for human culture and nature, both through the centuries and in our contemporary world. In addition to covering the foundations of plant biology, students will contextualize the science within broader society in the recitation sections. Together, students will better appreciate the human impacts on plants, and how plants impact human life. Students will also learn how plants adapt to changing environments, and how plants are critical to a collective response to the changing climate.

Course Content, Format, and Delivery:

This course consists of lectures on plant biology, readings and videos on related topics, demonstrations, and group discussions.

The first lecture every week will be a "Plants and People" lecture, a lecture which contextualizes the science being covered that week within history and culture. These lectures will feature the stories behind the science, and tie into how plant biology impacts our everyday lives. The second and third lectures every week will be plant biology lectures, lectures which delve into the plant anatomy, plant cell biology, plant genetics, and plant biotechnology topics which undergird the course.

Students have assigned readings and videos to review weekly. These are designed to be companions to the recitation sections and will cover a topic related to what is being covered in lecture that week. Students will read or watch the assigned materials and do weekly assignments prior to the recitation. The recitation sections will feature demonstrations and discussions of scientific topics. These topics include: how experiments are designed and analyzed, how science is reported in popular media, how scientists can see how individual genes are expressed, and a discussion on genetically modified organisms and their role in society.

Course Goals / Rationale

Goals and Expected Learning Outcomes (ELOs) for GE Foundations: Natural Sciences

1. Goal 1: Successful students will engage in theoretical and empirical study within the natural sciences while gaining an appreciation of the modern principles, theories, methods, and modes of inquiry used generally across the natural sciences.
2. Goal 2: Successful students will discern the relationship between the theoretical and applied sciences while appreciating the implications of scientific discoveries and the potential impacts of science and technology.

ELOs related to Goals 1	Course activities and assignments to meet these ELOs
<p>ELO 1.1 Explain basic facts, principles, theories, and methods of modern natural sciences, and describe and analyze the process of scientific inquiry</p>	<p>In the course activities, such as class discussions following the course lectures, readings, watching and reviewing videos, students will:</p> <ul style="list-style-type: none"> • critically investigate environmental impact on plants and humans. • logically recognize interdependence between them. • consider the effectiveness of various scientific strategies for communicating these topics. <p>In the recitation activity for weeks 3 and 4, students will:</p> <ul style="list-style-type: none"> • learn to ask scientific questions and design an experiment. • Learn to interpret scientific data and judge their robustness and relevance
<p>ELO 1.2 Identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods</p>	<p>Students will learn foundational knowledge in plant biology in lectures throughout the course of the semester. Some of the topics covered will include:</p> <ul style="list-style-type: none"> • How botany and plant biology became scientific disciplines, covering from plant gathering and farming through modern plant biology and plant biotechnology. • Discussion of the historical roots of plant genetics, and how the knowledge learned there was key to broad scientific knowledge. • Discussion of biomolecules isolated from plants for use in medicine, materials, cosmetics, and biofuels. • Discussion of modern genetic engineering techniques, including how these techniques are used to advance scientific inquiry. <p>Students will engage in discussions on scientific advancements as a part of the recitation portion of the course. Students will discuss:</p> <ul style="list-style-type: none"> • How to design and analyze experiments • How published science is communicated, and how scientific research gets interpreted by the popular press • Discussion of plant breeding, compared to genetically modified organisms (GMOs) produced via modern plant biotechnology techniques • Examination and discussion of cutting-edge science attempting to address the needs of modern society.

ELO 1.3 Employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models and analysis of data	As a part of the recitation, students will conduct hands-on experiments or activities several times throughout the semester. Activities will include: <ul style="list-style-type: none"> • Observation of plants in the wild throughout the semester. • Extraction of biomolecules from flowers. • Examining selection of desired traits in crops and other plants. • Visualizing gene expression in plants.
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ELOs related to Goals 2	Course activities and assignments to meet these ELOs
ELO 2.1 Analyze the inter-dependence and potential impacts of scientific and technological developments	<p>The lectures in the course will cover several topics in scientific impacts, including:</p> <ul style="list-style-type: none"> • How plants become a source of energy, and a storage for carbon • How plant engineering has been used to produce better crop yields, and allow plants to adapt to different climates • How plants interface and impact the broader environment <p>In recitation, students will discuss the impacts of scientific advancements, including:</p> <ul style="list-style-type: none"> • Discussion of how biofuels compare to fossil fuels, and how end uses for plants compete for land and crop usage • Discussion on the impacts of Genetically Modified Organisms (GMOs) • Discussion of how plants are being engineered to address climate change-related impacts
ELO 2.2 Evaluate social and ethical implications of natural scientific discoveries	<p>The lectures in the course will cover societal impacts of plants, including:</p> <ul style="list-style-type: none"> • How crops have been involved in empires and colonization, and the impacts that has had on plant cultivation and broader society. • How plant breeding has changed plant life, and how those plants have in turn impacted our everyday lives. • How cutting-edge plant biotechnologies can further be used to engineer plants for broad use. <p>In recitation, students will discuss the ethical implications of scientific advancements, including:</p> <ul style="list-style-type: none"> • How cultivation of crops for export worldwide impacts those societies • How climate change impacts plant cultivation, and how that interplays with demands on farming • Potential ethical issues with trademarking of genetic material, and trademarking of seed crops
ELO 2.3 Critically evaluate and responsibly	In recitation, students will learn how to critically evaluate scientific reporting, including:

use information from the natural sciences	<ul style="list-style-type: none"> • Discussion of how to design experiments and interpret their results • Discussion of how scientific advances get reported, then communicated through the popular press, and how to critically review scientific reporting
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Goals and Expected Learning Outcomes (ELOs) for Legacy GEs in Biological Sciences:

Students understand the principles, theories, and methods of modern science, the relationship between science and technology, the implications of scientific discoveries and the potential of science and technology to address problems of the contemporary world.

ELOs related to Legacy GE	Course activities and assignments to meet these ELOs
<p>ELO 1. Students understand the basic facts, principles, theories and methods of modern science.</p>	<p>The lectures in the course will cover several bedrock topics in modern science, including:</p> <ul style="list-style-type: none"> • Topics in Botany, Plant Anatomy, and Plant Biology. • Developments in Plant Breeding and Plant Genetics. • Cutting-edge advances in Plant Biotechnology. <p>In recitation, students will explore scientific topics in a more in-depth manner, including:</p> <ul style="list-style-type: none"> • Discussion of the scientific method and experimental design. • An examination of how scientific advances are disseminated in the popular press. • Visualizing how genes are expressed in different tissues.
<p>ELO 2. Students understand key events in the development of science and recognize that science is an evolving body of knowledge.</p>	<p>The lectures in the course will cover how scientific disciplines have developed, including:</p> <ul style="list-style-type: none"> • The origins and development of botany. • How the observation of plant traits was critical in the development of genetics as a discipline. • How plant breeding was critical in crop development, and how genetic engineering is spurring further crop development.
<p>ELO 3. Students describe the inter-dependence of scientific and technological developments</p>	<p>The lectures in the course will cover how scientific discoveries feed into technological developments, including:</p> <ul style="list-style-type: none"> • How cultivation and study of plants has led to materials and chemical advancements. • How plant metabolites have been developed into medical interventions • How advances in plant genetics have led to new frontiers in plant biotechnology <p>In recitation, students will discuss topics in biotechnology in a more in-depth manner, including:</p>

	<ul style="list-style-type: none"> • Development and drawbacks of Biofuels. • The Green Revolution. • Modern Genetic Engineering tools.
<p>ELO 4. Students recognize social and philosophical implications of scientific discoveries and understand the potential of science and technology to address problems of the contemporary world.</p>	<p>The recitation sections in the course will cover how plant science impacts the world around us, including:</p> <ul style="list-style-type: none"> • How coffee cultivation impacts the regions that grow it, and how climate change is impacting coffee cultivation. • How rubber cultivation is in danger, and how development of new crop species can address a need. • How biofuels came to be developed, and the limitations and impacts that come with them. • How the Green Revolution was impactful in world hunger, and the negative impacts felt over time from changes in farming. • How Genetically Modified Organisms can address many societal needs, and the ethical questions surrounding their development.

Additional Course Learning Outcomes

At the successful completion of the course the student will be able to:

- Develop capacities for observations, interpretation, evaluation, and analysis of the relationships between plants and humans in the lived environments
- Understand how plants respond to their environments at the cellular level.
- Develop critical, logical, creative thinking to evaluate the changing climate and its impact on plants and humans.
- Gain a basic understanding of plant anatomy, development, and the plant life cycle
- Understand how plants generate energy, and incorporate carbon as a part of their growth and development
- Develop an understanding of how humans have impacted plant life, and how plant life has shaped societies
- Gain an understanding for modern plant biotechnologies, and how they are utilized
- Connect knowledge of plant biology to broad impacts on society

Communication

The best way to contact us outside of class time is through email or the Carmen Inbox. We expect that you should email us only from your OSU email or the Carmen Inbox. Email can also be used to schedule individual Zoom meetings to talk. You can generally expect a reply to emails within 24 hours on weekdays. We expect that you are checking your Buckeyemail email and your Carmen Inbox regularly. It is recommended that you use Buckeyemail for communication regarding grades or other private matters, as the Carmen Inbox is not as secure of a platform.

Carmen (carmen.osu.edu) is used for general communication through announcements. Carmen is where the most up-to-date schedule, assignment information, grades and feedback, readings, due dates for assignments, reference documents and general course content components are posted. Grades will also be posted to Carmen.

Course Web Platforms and Technology

Carmen: carmen.osu.edu (<http://carmen.osu.edu/>)

Our course page on Carmen will contain all course documents. Students will upload assignments to specified Carmen drop boxes.

Microsoft One Drive: office365.osu.edu (<http://office365.osu.edu/>)

One Drive can be used as a cloud-based backup for your work. Uploading important files in case of a hard drive failure is a way to prevent lost work. One Drive will be used in this class as a way of sharing large files that do not easily upload to Carmen.

Other: a mobile device (smartphone or tablet)

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- Self-Service and Chat support: ocio.osu.edu/help
- Phone: 614-688-4357(HELP)F
- Email: servicedesk@osu.edu
- TDD: 614-688-8743

Requirements and Evaluation

Your performance will be evaluated on the quality of your work, your understanding of the basic skills and concepts covered, your resourcefulness, initiative, active participation in all class activities and overall rigor as a student.

Grading and Class work / Assignments

Weekly Reading Assignments	70 points
Weekly Recitation Activities	70 points
Exam I	120 points
Exam II	120 Points
<u>Final</u>	<u>120 points</u>
TOTAL	500 points

Assignments turned in late will be given half credit. If there are extenuating circumstances that will cause a project to be late, please communicate with us ahead of time and we will work on a case-by-case basis to make adjustments to this late policy

Grading Scale

A (93–100): 465-500 points

A- (90–92.9): 450-464 points

B+ (87–89.9): 435-449 points

B (83–86.9): 415-434 points
B- (80–82.9): 400-414 points

C+ (77–79.9): 385-399 points
C (73–76.9): 365-384 points
C- (70–72.9): 350-364 points

D+ (67–69.9): 335-349 points
D (60–66.9): 300-334 points

E (59.9–0): 0-299 points

Attendance Policy for Recitation Sections:

Attendance will be taken every recitation session. If you miss a class, for whatever reason, it is your responsibility to get ALL the information you missed from the instructor, or your classmates as soon as possible, and continue to complete all exercises, homework and projects on time.

It is Ohio State’s policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the semester begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student’s responsibility to ensure that all course assignments are completed.

Students with concerns or complaints under the policy are strongly encouraged, but not required, to first discuss those concerns with their instructor and/or the chair of the department. Students may also report their concerns or file a complaint with the Office of Institutional Equity via the [online reporting form](#), email at equity@osu.edu, or phone at 614-247-5838.

You are expected to come to class on time, ready to work and with all necessary supplies and materials. In the event of serious illness or other events that prevent you from completing work or meeting synchronously, please communicate with us as soon as possible and we can work together to create a new schedule to get you back on track.

Texts / Readings / Screenings:

Required Reading: Introductory Botany: Plants, People, and the Environment 2nd edition (2008) Linda Berg. Lecture material will be based primarily (but not entirely) on the required text. Additional short texts or diagrams for material not covered by the book will be distributed ahead of class on Carmen.

Articles, Videos, and Audio discussions as listed below will be associated with each week of the course. You will be expected to watch and read these materials prior to each week's recitation.

Academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

If we suspect that a student has committed academic misconduct in this course, we are obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact us.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- *Ten Suggestions for Preserving Academic Integrity* (go.osu.edu/ten-suggestions)

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: <https://contactbuckeyelink.osu.edu/>

FOR UNDERGRAD COURSES: <http://advising.osu.edu>

Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Your mental health

As a student you may experience a range of issues that can cause barriers to learn, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance

learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Accessibility accommodations for students with disabilities

Requesting accommodations

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let us know immediately so that we can privately discuss options. To establish reasonable accommodations, we may request that you register with Student Life Disability Services. After registration, make arrangements with us as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen Canvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Canvas accessibility \(go.osu.edu/canvas-accessibility\)](http://go.osu.edu/canvas-accessibility)
- Streaming audio and video
- Carmen Zoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

General Class and Lab Policies

- **Discussion and communication guidelines**

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably.

- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.
- Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender identity and expression, and nationalities. Class rosters are provided to the instructor and may include the student's legal name unless changed via the University Name Change policy. We will gladly honor your request to address you by another name or gender pronoun. Please advise us of this early in the semester so that we may make appropriate changes to our records.
- Tolerance. Required and elective art courses contain content that can include some language, imagery, or dialogue that may be challenging or offend some students. While no student is required to participate in a presentation or discussion of art or design that offends them, it is important to remain open-minded and participate in a cooperative and respectful manner. Art can often challenge our ideas and experiences, and can lead us into some lively discussion, concepts and imagery. Differences (in ideas, perspectives, experiences, etc.) can be positive, productive and educational, challenging and provocative, so please, engage in the exchange of ideas respectfully. Please see us with your concerns as soon as possible.
- Please contact us in advance (during the first week of class or as soon as circumstances develop during the term) if you have circumstances that may affect your performance and ability to fulfill your responsibilities in this course.
- **Statement on Title IX**

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu
- **Commitment to a diverse and inclusive learning environment**

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.
- **Land Acknowledgement**

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of

Greenville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that have and continue to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

<https://mcc.osu.edu/about-us/land-acknowledgement>

Course Calendar (Subject to change to support course learning objectives)

Week	Plants and People Lecture	Plant Biology Lecture 1 (Chapter)	Plant Biology 2 (Chapter)	Recitation (2h)
1	Aug 21 (W): Plants & People through the millennia: From gathering to farming	Aug 23 (F): Intro to Botany; scientific method (1)	N/A	Observing Plant Diversity: Discussion & Begin a “plant noticing journal”
2	Aug 26 (M): How can we know? A brief history of Botany	Aug 28 (W): Plant metabolites: Food	Aug 30 (F): Plant metabolites: Materials, Medicine	Observing Plant Diversity: Tour of the Biological Sciences Greenhouse
3	Sep 2 (M): <u>No Class: Labor Day</u>	Sep 4 (W): Intro to life: Chemistry of life (2)	Sep 6 (F): Intro to life: the plant cell (3)	Scientific method 1: How to perform and interpret an experiment.
4	Sep 9 (M): From where comes our oxygen: Time travels with a Paleobotanist	Sep 11 (W): Metabolism in cells: Photosynthesis (4)	Sep 13 (F): Metabolism in cells 2 (4)	Scientific method 2: How to design your own experiment.
5	Sep 16 (M): Roots and shoots and flowers and fruits: What exactly are we eating?	Sep 18 (W): Plant body plan, plant organs: Roots (5)	Sep 20 (F): Plant organs: Shoots/Leaves (6, 7)	Plant growth in diverse environments: A discussion of the impact of crop growth in different climates and cultures
6	Sep 23 (M): A roof over our head: Wood and other materials	Sep 25 (W): Plant organs; Modifications (8)	Sep 27 (F): Exam I	Plants in everyday life: Building and creating with Plants
7	Sep 30 (M): Plants and energy: from bogs and seams to modern life.	Oct 2 (W): Mineral nutrition and transport (10)	Oct 4 (F): Mineral nutrition and transport 2 (10)	Plants as energy & Carbon storage
8	N/A	Oct 7 (M): Plant signaling and growth response, hormones (11)	Oct 9 (W): Plant signaling and growth response, hormones 2 (11)	Plant response to the environment vs “Plant Behavior”
9	Oct 14 (M): Plants and medicine: How tree bark cures cancer	Oct 16 (W): Secondary metabolites	Oct 18 (F): Secondary metabolites 2	Isolation of biomolecules from plants

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10	Oct 21 (M) The Columbian Exchange: How humble plants have shaped great empires.	Oct 23 (W): Plant organs: Flowers (9)	Oct 25 (F): Plant organs: Fruits and seeds (9)	Floral diversity & flower pollination
11	Oct 28 (M) A Monk in the Garden: The life and work of Gregory Mendel	Oct 30 (W): Exam II	Nov 1 (F): Cell Division: Mitosis, Meiosis, life cycles (12)	Science in the public press: From news article to press release to scientific paper
12	Nov 4 (M): Form and Function: How genetic selection has changed plants	Nov 6 (W): Patterns of inheritance (13)	Nov 8 (F): The molecular basis of inheritance (14)	How Plant Breeders select for desirable traits: Interpreting a genetic cross
13	Nov 11 (M): <u>No Class: Veteran's Day</u>	Nov 13 (W): Genetic Frontiers (15)	Nov 15 (F): Evolution (16)	Visualizing gene expression in plants
14	Nov 18 (M): Plants & The Environment (EEOB Guest Lecture)	Nov 20 (W): Plant Genetic Engineering	Nov 22 (F): Plant Biotechnology: Theory	Discussion of Genetically Modified Organisms: Future potential, challenges and possible risks
15	Nov 25 (M): Plant Biotechnology: Applications	Nov 27 (W): <u>No Class- Thanksgiving</u>	Nov 29 (F): <u>No Class- Thanksgiving</u>	
16	Dec 2 (M): Plants and People: Together into the Future			

Recitations and Weekly Media

Weekly recitation sections will include a discussion of the science theme covered in that week's lectures. Every week, there will be assigned readings and videos accompanying the lectures. You must watch or read ALL of the assigned material for one type of media (readings or videos) to be prepared for recitation.

A weekly assignment must be turned in prior to recitation, which will ask questions based on that week's theme and assigned media.

Week	Theme	Readings	Videos
1	Plants in Society	Plant Blindness	What is Plant Blindness?
2	Plant Diversity	Naming Plants to Save Them ; What we know, what we don't, and how we find out	Why is Biodiversity Important?
3	Plant Domestication	Modern Tomatoes are very different from their wild ancestors	The Origin of our Food Crops ; Corn shouldn't be food, but is
4	Experimental Design	A Tale of Two Scientists	Oxygen
5	Environmental impacts on plants	What climate change means for the future of Coffee	TEDx Talk on Coffee ; Why Single-Origin Coffee is So Expensive ; The Global Coffee Crisis is Coming
6	Plants as Materials	The wonder material we need but is running out	The Dark Truth about Rubber ; The War for the Amazon's most valuable trees ; Natural Rubber from Dandelions
7	Plants as Fuel	The Guardian on Biofuels ; How corn ethanol for biofuel fed climate change	Is Algae the Fuel of the Future? ; The Problem with Biofuels
8	Plant Signaling and Behavior	Marcuso Interview ; The Mystery of the Mimic Plant	TED talk Marcuso 2010 ; Plant memory ; Can this plant actually see?
9	Plant Metabolites and Medicine	Building a Better Drug ; Just The Tonic	The hidden history of Gin and Tonic
10	Flowers & Reproduction	The Hidden Environmental Cost of Valentine's Day ; The Real Story Behind "Tulip Mania"	Orchids: These Flowers are Pretty Sus ; The Rose Capital of the World ; A time-lapse of flowers blooming
11	Science Communication	Three documents: an original science paper; a university press release; and the newspaper	none

		article derived from it. To be selected from recent topics before class.	
12	Plant Breeding and Plant Genetics	<u>The Green Revolution: Norman Borlaug and the Race to Fight Global Hunger ; Norman Borlaug: Wheat Breeder who averted famine with a Green Revolution</u>	<u>The Science of the world's most colorful corn ; Apple Breeding at the University of Minnesota</u>
13	Plant Biotechnology	<u>How Restriction Enzymes Changed Biology</u>	<u>CRISPR: Gene Editing and Beyond ; Promoters and Enhancers</u>
14	Genetically Modified Organisms	<u>The Next Green Revolution ; Second Revolution ahead for Green Revolution Grains</u>	<u>Harnessing Plants Initiative ; How supercharged plants could slow climate change</u>

GE Foundation Courses

Overview

Courses that are accepted into the General Education (GE) Foundations provide introductory or foundational coverage of the subject of that category. Additionally, each course must meet a set of Expected Learning Outcomes (ELO). Courses may be accepted into more than one Foundation, but ELOs for each Foundation must be met. It may be helpful to consult your Director of Undergraduate Studies or appropriate support staff person as you develop and submit your course.

This form contains sections outlining the ELOs of each Foundation category. You can navigate between them using the Bookmarks function in Acrobat. Please enter text in the boxes to describe how your class meets the ELOs of the Foundation(s) to which it applies. Because this document will be used in the course review and approval process, you should use language that is clear and concise and that colleagues outside of your discipline will be able to follow. Please be as specific as possible, listing concrete activities, specific theories, names of scholars, titles of textbooks etc. Your answers will be evaluated in conjunction with the syllabus submitted for the course.

Accessibility

If you have a disability and have trouble accessing this document or need to receive the document in another format, please reach out to Meg Daly at daly.66@osu.edu or call 614-247-8412.

GE Rationale: Foundations: Race, Ethnicity, and Gender Diversity (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** the expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Race, Ethnicity, and Gender Diversity, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational for the study of Race, Ethnicity and Gender Diversity.

Course Subject & Number: _____

B. Specific Goals of Race, Ethnicity, and Gender Diversity

GOAL 1: Successful students will engage in a systematic assessment of how historically and socially constructed categories of race, ethnicity, and gender, and possibly others, shape perceptions, individual outcomes, and broader societal, political, economic, and cultural systems.

Expected Learning Outcome 1.1: Successful students are able to describe and evaluate the social positions and representations of categories including race, gender, and ethnicity, and possibly others. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.2: Successful students are able to explain how categories including race, gender, and ethnicity continue to function within complex systems of power to impact individual lived experiences and broader societal issues. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.3: Successful students are able to analyze how the intersection of categories including race, gender, and ethnicity combine to shape lived experiences. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications of studying race, gender, and ethnicity. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

GOAL 2: Successful students will recognize and compare a range of lived experiences of race, gender, and ethnicity.

Expected Learning Outcome 2.1: Successful students are able to demonstrate critical self- reflection and critique of their social positions and identities. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 2.2: Successful students are able to recognize how perceptions of difference shape one’s own attitudes, beliefs, or behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 2.3: Successful students are able to describe how the categories of race, gender, and ethnicity influence the lived experiences of others. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met.

GE Rationale: Foundations: Social and Behavioral Sciences (3 credits)

Requesting a GE category for a course implies that the course **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Social and Behavioral Sciences, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Social and Behavioral Sciences.

Course Subject & Number: _____

B. Specific Goals of Social and Behavioral Sciences

GOAL 1: Successful students will critically analyze and apply theoretical and empirical approaches within the social and behavioral sciences, including modern principles, theories, methods, and modes of inquiry.

Expected Learning Outcome 1.1: Successful students are able to explain basic facts, principles, theories and methods of social and behavioral science. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.2: Successful students are able to explain and evaluate differences, similarities, and disparities among institutions, organizations, cultures, societies, and/or individuals using social and behavioral science. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

GOAL 2: Successful students will recognize the implications of social and behavioral scientific findings and their potential impacts.

Expected Learning Outcome 2.1: Successful students are able to analyze how political, economic, individual, or social factors and values impact social structures, policies, and/or decisions. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 2.2: Successful students are able to evaluate social and ethical implications of social scientific and behavioral research. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 2.3: Successful students are able to critically evaluate and responsibly use information from the social and behavioral sciences. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

GE Rationale: Foundations: Historical or Cultural Studies (3 credits)

Requesting a GE category for a course implies that the course fulfills the expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Historical and Cultural Studies, please answer the following questions for each ELO. Note that for this Foundation, a course need satisfy either the ELOs for Historical Studies or the ELOs for Cultural Studies.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of History **or** Cultures.

Course Subject & Number: _____

B. Specific Goals of Historical *or* Cultural Studies

Historical Studies (A) Goal: Successful students will critically investigate and analyze historical ideas, events, persons, material culture and artifacts to understand how they shape society and people.

Expected Learning Outcome 1.1A: Successful students are able to identify, differentiate, and analyze primary and secondary sources related to historical events, periods, or ideas. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.2A: Successful students are able to use methods and theories of historical inquiry to describe and analyze the origin of at least one selected contemporary issue. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.3A: Successful students are able to use historical sources and methods to construct an integrated perspective on at least one historical period, event or idea that influences human perceptions, beliefs, and behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.4A: Successful students are able to evaluate social and ethical implications in historical studies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Cultural Studies (B) Goal: Successful students will evaluate significant cultural phenomena and ideas to develop capacities for aesthetic and cultural response, judgment, interpretation, and evaluation.

Expected Learning Outcome 1.1B: Successful students are able to analyze and interpret selected major forms of human thought, culture, ideas or expression. Please link this ELO to the course goals and topics and identify the *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.2B: Successful students are able to describe and analyze selected cultural phenomena and ideas across time using a diverse range of primary and secondary sources and an explicit focus on different theories and methodologies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.3B: Successful students are able to use appropriate sources and methods to construct an integrated and comparative perspective of cultural periods, events or ideas that influence human perceptions, beliefs, and behaviors. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.4B: Successful students are able to evaluate social and ethical implications in cultural studies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met.

GE Rationale: Foundations: Writing and Information Literacy (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Writing and Information Literacy, please answer the following questions for each ELO.

Course Subject & Number: _____

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Writing and Information Literacy.

B. Specific Goals of Writing and Information Literacy

GOAL 1: Successful students will demonstrate skills in effective reading, and writing, as well as oral, digital, and/or visual communication for a range of purposes, audiences, and context.

Expected Learning Outcome 1.1: Successful students are able to compose and interpret across a wide range of purposes and audiences using writing, as well as oral, visual, digital and/or other methods appropriate to the context. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. Explain how the course includes opportunities for feedback on writing and revision. Furthermore, please describe how you plan to insure sufficiently low instructor-student ratio to provide efficient instruction and feedback. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.2: Successful students are able to use textual conventions, including proper attribution of ideas and/or source, as appropriate to the communication situation. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. Is an appropriate text, writing manual, or other resource about the pedagogy of effective communication being used in the course? (50-700 words)

Expected Learning Outcome 1.3: Successful students are able to generate ideas and informed responses incorporating diverse perspectives and information from a range of sources, as appropriate to the communication situation. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications in writing and information literacy practices. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

GOAL 2: Successful students will develop the knowledge, skills, and habits of mind needed for information literacy.

Expected Learning Outcome 2.1: Successful students are able to demonstrate responsible, civil, and ethical practices when accessing, using, sharing, or creating information. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 2.2: Successful students are able to locate, identify and use information through context appropriate search strategies. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 2.3: Successful students are able to employ reflective and critical strategies to evaluate and select credible and relevant information sources. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

GE Rationale: Foundations: Literary, Visual, or Performing Arts (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Literary, Visual, and Performing Arts, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Literary, Visual, or Performing Arts.

B. Specific Goals

Goal 1: Successful students will analyze, interpret, and evaluate major forms of human thought, cultures, and expression; and demonstrate capacities for aesthetic and culturally informed understanding.

Expected Learning Outcome 1.1: Successful students are able to analyze and interpret significant works of design or visual, spatial, literary or performing arts. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.2: Successful students are able to describe and explain how cultures identify, evaluate, shape, and value works of literature, visual and performing art, and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.3: Successful students are able to evaluate how artistic ideas influence and shape human beliefs and the interactions between the arts and human perceptions and behavior. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.4: Successful students are able to evaluate social and ethical implications in literature, visual and performing arts, and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Goal 2: Successful students will experience the arts and reflect on that experience critically and creatively.

Expected Learning Outcome 2.1: Successful students are able to engage in informed observation and/or active participation within the visual, spatial, literary, or performing arts and design. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 2.2: Successful students are able to critically reflect on and share their own experience of observing or engaging in the visual, spatial, literary, or performing arts and design.

Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

GE Rationale: Foundations: Natural Science (4 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Natural Sciences, please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Natural Science.

Course Subject & Number: _____

B. Specific Goals for Natural Sciences

GOAL 1: Successful students will engage in theoretical and empirical study within the natural sciences, gaining an appreciation of the modern principles, theories, methods, and modes of inquiry used generally across the natural sciences.

Expected Learning Outcome 1.1: Successful students are able to explain basic facts, principles, theories and methods of modern natural sciences; describe and analyze the process of scientific inquiry. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.2: Successful students are able to identify how key events in the development of science contribute to the ongoing and changing nature of scientific knowledge and methods. Please link this ELO to the course goals and topics and indicate specific activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.3: Successful students are able to employ the processes of science through exploration, discovery, and collaboration to interact directly with the natural world when feasible, using appropriate tools, models, and analysis of data. Please explain the 1-credit hour equivalent experiential component included in the course: e.g., traditional lab, course-based research experiences, directed observations, or simulations. Please note that students are expected to analyze data and report on outcomes as part of this experiential component. *(50-1000 words)*

Course Subject & Number: _____

GOAL 2: Successful students will discern the relationship between the theoretical and applied sciences, while appreciating the implications of scientific discoveries and the potential impacts of science and technology.

Expected Learning Outcome 2.1: Successful students are able to analyze the inter-dependence and potential impacts of scientific and technological developments. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 2.2: Successful students are able to evaluate social and ethical implications of natural scientific discoveries. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 2.3: Successful students are able to critically evaluate and responsibly use information from the natural sciences. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

GE Rationale: Foundations: Mathematical and Quantitative Reasoning (or Data Analysis) (3 credits)

Requesting a GE category for a course implies that the course fulfills **all** expected learning outcomes (ELOs) of that GE category. To help the reviewing panel evaluate the appropriateness of your course for the Foundations: Mathematical and Quantitative Reasoning (or Data Analysis), please answer the following questions for each ELO.

A. Foundations

Please explain in 50-500 words why or how this course is introductory or foundational in the study of Mathematical & Quantitative Reasoning (or Data Analysis).

B. Specific Goals for Mathematical & Quantitative Reasoning/Data Analysis

Goal: Successful students will be able to apply quantitative or logical reasoning and/or mathematical/statistical analysis methodologies to understand and solve problems and to communicate results.

Expected Learning Outcome 1.1: Successful students are able to use logical, mathematical and/or statistical concepts and methods to represent real-world situations. Please link this ELO to the course goals and topics and indicate *specific* activities/ assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.2: Successful students are able to use diverse logical, mathematical and/or statistical approaches, technologies, and tools to communicate about data symbolically, visually, numerically, and verbally. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.3: Successful students are able to draw appropriate inferences from data based on quantitative analysis and/or logical reasoning. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Course Subject & Number: _____

Expected Learning Outcome 1.4: Successful students are able to make and evaluate important assumptions in estimation, modeling, logical argumentation, and/or data analysis. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)

Expected Learning Outcome 1.5: Successful students are able to evaluate social and ethical implications in mathematical and quantitative reasoning. Please link this ELO to the course goals and topics and indicate *specific* activities/assignments through which it will be met. (50-700 words)