

Term Information

Effective Term Autumn 2023
[Previous Value](#) [Autumn 2022](#)

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

to submit the Honors version of PUBHBIO 2210 for approval for the GE foundations: Mathematical and Quantitative Reasoning

What is the rationale for the proposed change(s)?

PUBHBIO 2210 was approved for this GE category, but we had not yet submitted the Honors version

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

none

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Pub Hlth: Biostatistics
Fiscal Unit/Academic Org	College of Public Health - D2505
College/Academic Group	Public Health
Level/Career	Undergraduate
Course Number/Catalog	2210H
Course Title	Honors Biostatistics for Public Health Research
Transcript Abbreviation	H Biostat Pub Hlth
Course Description	Hands-on experience using statistical tools to answer real-world questions. Students will design and implement a short survey and analyze their results. Emphasis on analysis of actual survey data using statistical software. Statistical topics include numerical/graphical summaries, measures of association, and hypothesis testing. Focus is on interpretation, not calculation.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	Less than 50% at a distance
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
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
Previous Value	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites	Prereq: Honors standing, or permission of instructor.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	26.1102
Subsidy Level	Baccalaureate Course
Intended Rank	Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors
Mathematical and Quantitative Reasoning (or Data Analysis)

Previous Value

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Understand why biostatistics is important in public health research
 - Define biostatistics and how it differs from statistics
 - Explain why biostatistics is a necessary part of public health research
- Understand what a research question is and how to design a study/survey to address the question
 - Translate a general idea into a specific research question
 - Identify what data will be needed to answer a specific research question
- Construct a survey to collect data specific to a research question
 - Implement a short survey
- Prepare data for statistical analysis
 - Explain the difference between qualitative and quantitative data
 - List the different types of quantitative data
- Employ methods for assessing the quality of data appropriate for different types of quantitative data
 - Construct "derived variables" appropriate for different types of data
- Learn methods for effectively organizing and interpreting quantitative data
 - Choose and calculate appropriate numerical summary measures for different data types
 - Choose and create appropriate graphical summary measures for different data types
- Explain the pros and cons to using visual versus numeric representations of data
 - Construct confidence intervals for means and proportions using statistical software
- Prepare a written report and scientific poster describing the results of a survey that would be understandable to someone who has not taken this course
- Understand the concept of association applied to different data types
 - Identify the correct measure of association for different combinations of data types
 - Use statistical software to calculate measures of association
- Understand how to select/use hypothesis tests for different data types and scientific questions
 - Choose the correct hypothesis test for different data types
 - Use statistical software to perform statistical hypothesis tests
- Explain the results of hypothesis tests for a single variable: one-sample t-test, Wilcoxon signed rank test, binomial test for a proportion
- Explain the results of hypothesis tests for two variables: two-sample t-test, Wilcoxon rank sum test, chi-square test, Fisher's exact test, one-way ANOVA, simple linear regression
- Learn concepts of statistical power
 - Explain the different types of errors possible in statistical tests
 - List the factors that impact statistical power

Content Topic List

- What is biostatistics?
- Types of data
- Graphical and numeric summaries of data
- Confidence intervals and hypothesis tests concepts
- Confidence intervals for means, proportions
- Univariable hypothesis tests
- Multivariable hypothesis tests
- Multiple comparisons
- Power and sample size

Sought Concurrence

No

Previous Value

Yes

Attachments

- PUBHBIO 2210H-Honors Biostatistics for Public Health Research-SP23-Odei.pdf: revised syllabus including GE information
(Syllabus. Owner: Droesch, Kynthia Ellen)
- PUBHBIO_2210 H-ge-foundations-submission.pdf: GE Rationale: Foundations: Math & Quant Reasoning
(Other Supporting Documentation. Owner: Droesch, Kynthia Ellen)

Comments

- See feedback email sent to dept. 05-09-2023 RLS *(by Steele, Rachel Lea on 05/09/2023 01:24 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Droesch, Kynthia Ellen	04/10/2023 10:29 AM	Submitted for Approval
Approved	Anderson, Sarah Elizabeth	04/10/2023 12:12 PM	Unit Approval
Approved	Bisesi, Michael Salvatore	04/10/2023 12:52 PM	College Approval
Revision Requested	Steele, Rachel Lea	05/09/2023 01:24 PM	ASCCAO Approval
Submitted	Bisesi, Michael Salvatore	05/09/2023 01:27 PM	Submitted for Approval
Approved	Anderson, Sarah Elizabeth	05/09/2023 02:52 PM	Unit Approval
Approved	Bisesi, Michael Salvatore	05/09/2023 03:02 PM	College Approval
Approved	Vankeerbergen, Bernadette Chantal	05/31/2023 11:30 AM	ASCCAO Approval
Approved	Martin, Andrew William	05/31/2023 11:35 AM	ASC Approval
Pending Approval	Humbel-Courtney, Julie Elizabeth	05/31/2023 11:35 AM	Honors Approval

PUBHBIO 2210H – Honors Biostatistics for Public Health Research
3 credit hours – Spring, 2023

- Instructor:** James B. Odei, Ph.D.
Office: 248 Cunz Hall
Phone: 614-247-8048
Email: odei.3@osu.edu
- Office Hours:** Tuesdays 2:00pm–3:00pm EST and Wednesdays 11:30am–12:30pm EST, or by Appointment via (OSU Carmen) Zoom and **in-person (Cunz Hall, room 248)**
Zoom Link (Tuesdays):
<https://osu.zoom.us/j/92860716444?pwd=aUI2Szh1RlNVSmJkd0k1TVl4QmZGdz09>
Meeting ID: 928 6071 6444
Password: 010827

Zoom Link (Wednesdays):
<https://osu.zoom.us/j/92479960864?pwd=d0pTbjlieklJMVRlc0p6c0ZEeW90UT09>
Meeting ID: 924 7996 0864
Password: 394437
- Class Time:** Mon/Wed 12:40pm–1:35pm EST, Cunz Hall–room 230 (2nd floor computer lab)
Fri – distance learning day (no in-person meeting, except Friday 4/14)
- Teaching Assistant (TA):** David Angeles
Email: angeles.6@osu.edu or angeles.6@buckeyemail.osu.edu
- TA Office Hours:** Mondays 1:45pm–2:45pm EST via (OSU Carmen) Zoom and **in-person (Cunz Hall, 2nd Floor, room 241 A & B Cubicles).**
Zoom Link (Mondays):
<https://osu.zoom.us/j/98795913838?pwd=NlF5UXFvWXFJZnprRmF0ZXNqcwR4dz09>
Meeting ID: 987 9591 3838
Password: 216662
- TA Responsibilities:** The TA assigned to the course will assist with the online activities, hold regular office hours, and lead review sessions for any students who need help with class material. The TA may assist with scoring assignments and exams; however, final grades will be assigned by the professor. **Any questions regarding grading must be directed to the professor and not the TA.**
- Course Description:** Hands-on experience using statistical tools to answer real-world questions. Students will design and conduct a study to answer a public health related research question of interest. Data will be collected using a short survey and

through at least one other method (literature review, available data from other studies, etc.) and analyze their results. Emphasis is on analysis of actual survey data using statistical software. Statistical topics include numerical/graphical summaries, measures of association, and hypothesis testing. Focus is on interpretation, not calculation. The results of the analysis will be presented in a poster presentation as well as in a paper.

Pre-requisites: Honors standing or permission of instructor

GE Information:

This course satisfies GE requirement for the Foundations: Mathematical and Quantitative Reasoning (Data Analysis) category. The goals and the university's stated expected learning outcomes for this requirement are as follows.

GE Goals:

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

GE Expected Learning Outcome (ELO):

- ELO 1.1 Successful students are able to use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
- ELO 1.2 Successful students are able to use diverse logical, mathematical and/or statistical approaches, technologies, and tools to communicate data symbolically, visually, numerically, and verbally.
- ELO 1.3 Successful students are able to draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
- ELO 1.4 Successful students are able to make and evaluate important assumptions in estimation, modeling, logical argumentation, and/or data analysis.
- ELO 1.5 Successful students are able to evaluate social and ethical implications in mathematical and quantitative reasoning.

Course Learning Objectives:

Upon successful completion of the course, students will be able to:

1. Translate a general idea into a specific research question (ELO 1.5)
2. Construct a survey to collect data specific to a research question (ELO 1.5)
3. Choose and calculate/create the appropriate numerical and graphical summary measures for different data types (ELO 1.1-1.2)
4. Construct confidence intervals for means and proportions (ELO 1.1, 1.3)
5. Choose and perform the appropriate hypothesis test for different data types and interpret the results (ELO 1.1, 1.3-1.4)
6. Summarize statistical results through written, visual, and oral communication methods so that results are understandable to someone who has not taken this course (ELO 1.2, 1.5)

Foundational Competencies:

- Apply the fundamental principles of the five core disciplines of public health (biostatistics; environmental health; epidemiology; health administration/policy; health behavior/promotion) to domestic and international population health issues. (5)
- Communicate public health information, in both oral and written forms, through a variety of media

- and to diverse audiences. (6)
- Locate, use, evaluate and synthesize public health information. (7)

CEPH Domains:

- **Role and Importance of Data in Public Health:** Address the basic concepts, methods, and tools of public health data collection, use, and analysis and why evidence-based approaches are an essential part of public health practice. (2)
- **Health Communications:** Address the basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology (9)

CEPH Cross-Cutting Concepts:

- Independent work and a personal work ethic (6)
- Research methods (10)
- Teamwork and leadership (12)

Alignment of Course Assessments with Degree Program Competencies, Course Objectives, CEPH Domains, and CEPH Cross-Cutting Concepts

Assessment	Course Objectives	Competencies	Domains	Cross-Cutting Concepts
Exams	3, 4, 5, 6	5, 7	2	10
Quizzes	3, 4, 5, 6	5, 7	2	10
Lab Exercises	4, 5, 6	5, 6, 7	2, 9	10
Activities	2, 3, 5, 6	5, 6, 7	2, 9	10
Survey Project: Homework	1, 2, 4, 5, 6, 7	5, 6, 7	2, 9	6, 10, 12
Survey Project: Video Presentation	1, 2, 4, 5, 6, 7	5, 6, 7	2, 9	10, 12
Survey Project: Paper	1, 2, 4, 5, 6, 7	5, 6, 7	2, 9	6, 10

Course Format: This is a **hybrid course**. There are some required sessions when you must be logged in to Carmen at a scheduled time. Generally, the Monday and Wednesday in-class sessions will consist of problem solving, class activities, group discussion (“digging deeper”), and computer lab exercises. The Friday class will be completed via distance learning, except for the last Friday of the semester (4/21) which will be part of a week-long poster session. Students will be responsible for reading the assigned textbook chapter(s), watching the recorded lecture, reviewing the lecture notes, and completing the online quiz before the following Monday. Lectures and quizzes will be posted in advance on Thursday. Students must complete each quiz by midnight Sunday (see schedule for exact dates).

Credit Hours and Work Expectations: This is a **3-credit-hour course**. According to [Ohio State policy \(go.osu.edu/credithours\)](http://go.osu.edu/credithours), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and Participation Requirements:	Attendance at each class session and participation in in-class activities is expected. This class meets in a computer lab, and the computers are to be used only for class activities. Use of non-course related websites or other software during class is not allowed. Additionally, the use of cell phones, pagers and text messaging devices will not be permitted during class time. If a student is caught inappropriately using the computers or is caught using one of these devices, 2% of the student's final grade will be automatically deducted.
Required Text:	<i>Intuitive Biostatistics, 4th Edition</i> , by Harvey Motulsky (2018) Note: 3 rd edition (2014) or other previous editions may also be used The text is intended as a supplement to course materials available on Carmen. No assignments or assessments require this text.
Additional Readings:	In addition to assigned textbook readings, students will occasionally be expected to read articles from peer-reviewed literature as well as other resources. These readings will be made available through Carmen.
Reference Text:	<i>R for Data Science</i> , by Hadley Wickham & Garrett Grolemund This book is freely available online at https://r4ds.had.co.nz/ and may be a helpful resource in learning the required software.
Required Statistical Software:	RStudio Desktop Open-Source License (https://rstudio.com/products/rstudio/download/) You will be introduced to the software program R (https://www.r-project.org/) and RStudio. For purpose of illustration and to get the best computing support, students are required to use R for all lab/homework assignments and activities (i.e., all data analysis assignments). You can obtain R free of charge for your personal computer (Windows, Mac, or Linux) through the links above. R is also available on the PCs in the Cunz Hall computer lab (room 230). This software is also provided for this course through a remote server so that students can access it anywhere they have an internet connection by going to: https://remotelab.osu.edu/#/ and logging in with their name.# . Note that the login procedure requires BuckeyePass, also referred to as Duo or 2-factor authentication http://ocio.osu.edu/KB05023 – the same procedure as is required to access Carmen.
Required Survey Software:	Qualtrics (osu.qualtrics.com) You will be using Qualtrics, an online survey software tool, to create and implement a survey. Instructions for creating an account and using the software will be provided.
Course Technology:	(1) <i>TECHNOLOGY SUPPORT</i> For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at https://ocio.osu.edu/help/hours , and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

(2) *TECHNOLOGY SKILLS NEEDED FOR THIS COURSE*

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent): for questions about specific functionality, see the [Canvas Student Guide](#).
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration (go.osu.edu/video-assignment-guide)
- Recording, editing, and uploading video (go.osu.edu/video-assignment-guide)

(3) *REQUIRED EQUIPMENT*

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

(4) *REQUIRED SOFTWARE*

- **Microsoft Office 365:** All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen Access:

Login at <http://carmen.osu.edu> with your OSU internet username (**name.#**) and password then go to PUBHBIO 2210H. The site will contain the syllabus, recorded lectures, quizzes, assignments, and additional readings. All assignments **must** be turned in electronically via the Carmen dropbox, unless otherwise directed.

You will need to use [BuckeyePass \(buckeyepass.osu.edu\)](http://buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](#) help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click “**Enter a Passcode**” and then click the “**Text me new codes**” button that appears. This will text you ten passcodes good for 365 days that can each be used once.

- Download the [Duo Mobile application \(go.osu.edu/install-duo\)](https://go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and the IT support staff will work out a solution with you.

Faculty Feedback & Response Time:

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.
- **Email:** I will reply to emails within **24 hours on days when class is in session at the university**.
- **Discussion board:** I will check and reply to messages in the discussion boards every **24 hours on school days**

Grading:

Final class grade will be determined as follows:

2 Exams	15% each (30% total)
Quizzes & Participation	15%
Lab Exercises	10%
Activities	5%
Survey Project: Homework	5%
Survey Project: Poster	15%
Survey Project: Written Paper	20%

Any questions regarding grading should be addressed within one week of the return of the assignments or exams. **Any questions regarding grading must be directed to the professor and not the TA.**

Grading Scale:

93 – 100	A	87 – 89.99	B+	77 – 79.99	C+	67 – 69.99	D+
90 – 92.99	A-	83 – 86.99	B	73 – 76.99	C	60 – 66.99	D
		80 – 82.99	B-	70 – 72.99	C-	0 – 59.99	E

Exams:

There will be two in-class midterm exams. Both exams will have a similar structure (multiple choice and short answer response) and involve data analysis and interpretation using the computer. The exams will be on **Wednesday, February 15, 2022**, and **Wednesday, March 29, 2022**. If you cannot make it for an exam due to a scheduling conflict, you must make arrangements with the instructor **at least one week prior to the scheduled exam**. Students who miss an exam **will not be allowed** to take a make-up exam and in the absence of a documented excuse will receive a 0 on the exam.

Assignments: All due dates are by 11:59 pm EST and submission is through Carmen. Students are strongly encouraged to submit well in advance of deadlines to avoid difficulties, technical or otherwise. Quizzes, labs, and activities not submitted on time will receive no credit. Survey project assignments submitted up to 72 hours late will have the earned score scaled by 50%. For example, an assignment due Friday but submitted the following Monday scoring 9/10 submitted will receive a score of $(9/10) \times (50\%) = 4.5/10$.

Quizzes: Upon completion of each distance lecture, students will need to take a short quiz on Carmen. The quiz will be active up until **11:59 pm EST** the day it is due (see schedule for exact dates). A score of at least 80% on a quiz receives full credit for that quiz at the end of the semester before final course grades are computed. If a student scores below an 80% on a quiz, he/she will receive 0 points for that quiz but will have the opportunity to “make up” the quiz (i.e., to avoid the 0 points). Otherwise, 0 points will be awarded for that quiz at the end of the semester before final course grades are computed. If a quiz is not completed before the due date, 0 points will be given for that quiz (**note: no quiz make-up is allowed in this case**). **Detailed instruction for the quiz make-up is available under Module 0 – “Course Administration” module (and in the quiz-make up dropbox) in CARMEN.** The instructor reserves the right to penalize students who abuse this quiz make-up policy. **Quizzes must be completed without the help of other individuals (books and notes are okay).**

R Lab Exercises: Approximately one class meeting per week will consist of a computer lab session with lab exercises provided on the day of the lab. Exercises should be completed during the lab session and must be turned in electronically via Carmen. Exercises are designed to be completed during class time, but if extra time is necessary, they must be turned in via Carmen by **11:59 pm EST on Friday after the lab session**. Students may work together but **must** submit their own work in their own writing. No late lab assignments will be accepted.

“Digging Deeper”: Approximately four class meetings will consist of a discussion session involving more advanced topics, readings or delving into course material in a holistic and conceptual framework. Students will prepare discussion questions based upon the “digging deeper” assignment and grade will be based on these questions and contribution to the overall group discussion. These sessions will be largest contributor to the participation portion of the course grade, and each will be weighted the same as a course quiz.

Survey Project: Students will design and implement a short survey as an ongoing project throughout the course, culminating in a final video presentation and final written report (details below). Students will work **in pairs assigned by the instructor** to design and implement the survey and to create a scientific poster, however, each student will write his/her own final report/paper.

Survey Project – Homework: There will be 7 homework assignments related to the survey assignment that students will be working on throughout the course. Most of these homework

assignments will be completed and submitted (**electronically** through the Carmen dropbox) in the assigned pairs. A few selected assignments must be completed independently, and this will be explicitly stated on those assignments.

*Survey Project –
Poster:*

Students will work in the assigned pairs to create a scientific poster. Three class periods (**Wed 4/19, Fri 4/21, Mon 4/24**) will be poster sessions where students will present their posters to other students and to the instructor and TA. Grades for the project will be determined by (a) the student's poster, and (b) attending other students' poster sessions and completing peer feedback forms. Specific instructions for the poster will be provided.

*Survey Project –
Final Paper:*

The final assignment for this course will be a written paper, due on **Monday, 5/1 by 11:59 pm EST**. While students will be working **in pairs** to design and implement the survey, each student will write **his/her own final paper**. Specific instructions for the final paper will be provided in Carmen.

Course Integrity:

Policies for this online course include the following:

- **Quizzes and exams:** You must complete the midterm and/or final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks with points attached.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow [MLA/APA] style to cite the ideas and words of your research sources (including class articles and cases) you use for your written assignments and discussion points. You are encouraged to ask a trusted person to proofread your assignments before you turn them in – but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you have explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you are unsure about a particular situation, please feel free just to ask ahead of time.
- **Group projects:** This course includes group projects, which can be stressful for students when it comes to dividing work, taking credit, and receiving grades and feedback. I have attempted to make the guidelines for group work as clear as possible for each activity and assignment, but please let me know if you have any questions.

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 us maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm does not always come across online.
- **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.

Health and Safety Requirements

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (<https://safeandhealthy.osu.edu>), which includes following university mask policies and maintaining a safe physical distance at all times. Non-compliance will be warned first, and disciplinary actions will be taken for repeated offenses.

Statement with COVID Process Addition

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's [request process](#), managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me 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; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Disability Statement

Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Office of Student Life: Disability Services at 614-292-3307 (TDD: 614-292-0901) in room 098 Baker Hall, 113 W. 12th Avenue to coordinate reasonable accommodations for students with documented disabilities. (<http://slds.osu.edu>). More resources regarding accessibility can be found at: <https://ada.osu.edu>.

Mental Health Services

As a student, you may experience a range of issues that can cause barriers to learning, 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. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting <https://ccs.osu.edu> or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. 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 Suicide Prevention Hotline at 1-800-273-TALK or at <https://suicidepreventionlifeline.org>

Academic Integrity

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (<https://oaa.osu.edu/academic-integrity-and-misconduct>). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the *Student Handbook*. Ignorance of the *Code of Student Conduct* and the *Student Handbook* is never considered an "excuse" for academic misconduct.

If I suspect a student of academic misconduct in this course, I am obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the 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 me.

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

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.htm)

Copyright Disclaimer

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.

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, Melissa Mayhan, at titleix@osu.edu or 614-247-5838.

Course Schedule (subject to change; most current version is always posted to Carmen)

Topic	Class	Date	Format	Readings	Assignment (Due date)
A. Introduction	1	Mon 1/9	In-class lecture	Ch 1-3	Watch lecture #0; Interests Questionnaire
	2	Wed 1/11	In-class activity		Activity #1
B. Types of data and software intro	3	Fri 1/13	Distance day	Ch 8	Watch lecture #1; Quiz #1 (by Sun 1/15)
	4	Mon 1/16	No Class – MLK		
	5	Wed 1/18	Lab		Lab #1; HW #1 (due Fri 1/20)
C. Graphical & numeric data summaries	6	Fri 1/20	Distance day	Ch 7, 9-11	Watch lecture #2; Quiz #2 (by Sun 1/22)
	7	Mon 1/23	In-class activity		Activity #2
	8	Wed 1/25	Lab		Lab #2; HW #2 (due Fri 1/27)
D. Confidence intervals & hypothesis tests	9	Fri 1/27	Distance day	Ch 4, 15-17	Watch lecture #3; Quiz #3 (by Sun 1/29)
	10	Mon 1/30	Lab		Lab #3
	11	Wed 2/1	In-class activity		Activity #3; HW #3 (due Fri 2/3)
E. Confidence intervals; means & proportions	12	Fri 2/3	Distance day	Ch 4, 12-14	Watch lecture #4; Quiz #4 (by Sun 2/5)
	13	Mon 2/6	Lab		Lab #4
	14	Wed 2/8	In-class activity		Activity #4; HW #4 (due Fri 2/10)
F. Univariable hypothesis tests	15	Fri 2/10	Distance day	Ch 18-19	Watch lecture #5; Quiz #5 (by Sun 2/12)
	16	Mon 2/13	Lab		Lab #5
EXAM #1	17	Wed 2/15	In-class timed exam		
G. Multivariable hypothesis tests: categ./categ.	18	Fri 2/17	Distance day	Ch 27-28	Watch lecture #6; Quiz #6 (by Sun 2/19)
	19	Mon 2/20	Lab		Lab #6
	20	Wed 2/22	In-class activity		Activity #5; HW #5 (due Fri 2/24)
H. Multivariable hypothesis tests: cont./categ.	21	Fri 2/24	Distance day	Ch 30, 39	Watch lecture #7; Quiz #7 (by Sun 2/26)
	22	Mon 2/27	Lab		Lab #7
	23	Wed 3/1	In-class activity		Activity #6
I. Multiple comparisons	24	Fri 3/3	Distance day	Ch 22-23, 40	Watch lecture #8; Quiz #8 (by Sun 3/5)
	25	Mon 3/6	Lab		Lab #8
	26	Wed 3/8	In-class activity		Activity #7; HW #6 (due Fri 3/10)
J. Multivariable hypothesis tests: cont./cont.	27	Fri 3/10	Distance day	Ch 32-33	Watch lecture #9; Quiz #9 (by Sun 3/19)
		Mon 3/13	No class – SPRING BREAK		
		Wed 3/15	No class – SPRING BREAK		
		Fri 3/17	No class – SPRING BREAK		

	28	Mon 3/20	Lab		Lab #9
	29	Wed 3/22	In-class activity		Activity #8
K. Capstone example	30	Fri 3/24	Distance day	Ch 44-45	Watch lecture #10; Quiz #10 (by Sun 3/26)
	31	Mon 3/27	In-class activity		Activity #9; HW #7 (due Fri 3/31)
EXAM #2	32	Wed 3/29	In-class timed exam		
L. Power and sample size	33	Fri 3/31	Distance day	Ch 20, 26	Watch lecture #11; Quiz #11 (by Sun 4/2)
	34	Mon 4/3	In-class activity		Activity #10; HW #8 (due Wed 4/5)
	35	Wed 4/5	Lab		Lab #10
M. Paired data	36	Fri 4/7	Distance day	Ch 31	Watch lecture #12; Quiz #12 (by Sun 4/9)
	37	Mon 4/10	In-class activity		Activity #11; HW #9 (due Fri 4/14)
	38	Wed 4/12	Lab		Lab #11
N. Poster Presentations	39	Fri 4/14	Distance day		No lecture – work on posters
	40	Mon 4/17	In-class activity		Final drafts of posters due Mon 4/17
	41	Wed 4/19	Poster session #1		
	42	Fri 4/21	Poster session #2		
	43	Mon 4/24	Poster session #3		
FINAL PAPER		Mon 5/1			Final Paper (due Mon 5/1)* End-of-Semester Peer Evaluation for Members of Group Project (due Mon 5/1)

Readings are in the Intuitive Biostatistics textbook

**Deadline may be extended if specific circumstances warrant – must contact instructor in advance*

MLK – Martin Luther King Jr. Day

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)