

OFFICE OF PUBLIC HEALTH STUDIES
Undergraduate Course Syllabus



UNIVERSITY
of HAWAII®
MĀNOA

This syllabus is tentative and subject to revisions at the discretion of the instructor.

1. Course Information

Course Number and Title: PH210 – Quantitative Reasoning for Public Health
Number of Credit Hours: 3
Course Meeting Days and Times: ONLINE
Course Meeting Place: N/A
Prerequisite Courses: None

2. Instructor Information

Name: Eric Hurwitz
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Thomas Lee
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Office Location: Biomed D-104H

3. Course Description

The purpose of this course is to enable public health students to become better critical thinkers by engaging them as active learners of quantitative analytic methods.

Through numerous examples, exercises, and activities featuring public health and other real-world data from the state of Hawaii and elsewhere, students will develop the skills necessary to (1) identify, analyze, and solve real-world problems that involve quantitative information; (2) reason quantitatively and make numerical arguments; (3) interpret and communicate the results of quantitative analyses; (4) use technology and internet resources effectively and build skills in working with data; and (5) develop and improve “numerical intuition” and confidence in the ability to engage in quantitative thinking.

The course is divided into three modules: Numerical Reasoning, Logical Reasoning, and Statistical Reasoning. Numerical Reasoning provides a foundation for quantitative reasoning and communication. It includes topics related to using numbers, functions, and graphs and an introduction to problem solving. Logical Reasoning addresses different types of reasoning and applications and concludes with a further discussion of problem-solving techniques. Statistical Reasoning includes investigations of descriptive statistics, probability, and sampling.

Throughout the course, students use a variety of methods of analysis: inductive and deductive reasoning; tabular, symbolic, verbal, and graphical forms of functions and relations; graphs and pictorial representations of

data; interpretations of probabilistic data; surveys and statistical studies. Microsoft Excel is used to help students visualize data and to facilitate calculations.

Examples, exercises, and activities use real data or draw on real-life situations to demonstrate the significance of quantitative reasoning in students' daily lives and to illustrate misapplications of mathematics and quantitative reasoning. The use of real data highlights the relevance and practicality of the material, thus giving students a better understanding of the concepts. The course shows how useful and relevant mathematics is for understanding public health and other aspects of the world we live in and for making informed personal and societal decisions based on the proper use of quantitative information and reasoning.

One to two chapters and explorations on the topic(s) are assigned each week. Students are required to read the chapter(s), complete and discuss assigned explorations questions, listen to all responses on Padlet, and complete weekly quizzes with uploaded excel activities. Additionally, students will be expected to complete a project using the skills they learned from this course.

4. Course Schedule (Class Dates, Topics, and Assignments)		
Date	Topic	Assignments Due
8/26 Week 1	Introductions and Orientation to Numerical Reasoning (NR), Logical Reasoning (LR), and Statistical Reasoning (SR) Topic 1 (NR): Organizing Information Pictorially Using Charts and Graphs Excel Activity 1-1: Calculating Percentages and Fractions Excel Activity 2-1: Bar Graphs Excel Activity 3-1: Pie Charts	<ul style="list-style-type: none"> • Introduction Video • Reading: Ch. 1 • Explorations #: 1,3,5,6,9,12,13,14,15,18 • Syllabus Quiz
9/2 Week 2	Topic 2 (NR): Bivariate Data Excel Activity 2-1: Scatterplots	<ul style="list-style-type: none"> • Reading: Ch. 2 • Explorations #: 2,3,4,5,7,8,9 • Quiz 1
9/9 Week 3	Topic 3 (NR): Graphs of Functions Excel Activity 3-1: Line Graphs	<ul style="list-style-type: none"> • Reading: Ch. 3 • Explorations #: 1,2,3,5,6,9,10,11,12,14 • Quiz 2
9/16 Week 4	Topic 4 (NR): Multiple Variable Functions Excel Activity 4-1: Entering a Formula	<ul style="list-style-type: none"> • Reading: Ch. 4 • Explorations #: 1,3,5,6,7,8,9,10 • Quiz 3
9/23 Week 5	Topic 5 (NR): Proportional, Linear, and Piecewise Linear Functions Excel Activity 5-1: Rates of Change and Linear Functions	<ul style="list-style-type: none"> • Reading: Ch. 5 • Explorations #: 1,3,4,6,7,8,10 • Quiz 4
9/30 Week 6	Topic 6 (NR): Modeling with Linear and Exponential Functions Excel Activity 1: Finding a Regression Line	<ul style="list-style-type: none"> • Reading: Ch. 6 • Explorations #: 1,5,7,8,9,10,11,12,13 • Quiz 5
10/7 Week 7	Topic 7 (NR): Logarithms and Scientific Notation Excel Activity 7-1: Richter Scale and Logarithms Excel Activity 7-2: Scientific Notation and Properties of Logarithms	<ul style="list-style-type: none"> • Reading: Ch. 7 • Explorations #: 3,5,6,7,8,9,10,12 • Quiz 6
10/14 Week 8	Topic 8 (NR): Indexes and Ratings Excel Activity 8-1: Scatterplots with Non-Contiguous	<ul style="list-style-type: none"> • Reading: Ch. 8 • Explorations #:

	columns Excel Activity 8-2: Entering a Formula with a Value Kept Constant	1,2,3,5,9,10,11,13 • Quiz 7
10/21 Week 9	Topic 9 (NR): Personal Finances Topic 10 (NR): Introduction to Problem Solving Excel Activity: Creating a Scroll Bar	• Reading: Ch. 9 & 10 • Ch. 9 Explorations #: 1,4,9,10,11,13,15 • Ch. 10 Explorations #: 4,9,10 • Quiz 8 • Project Survey Questions
10/28 Week 10	Topic 11 (LR): Decision Making Excel Activity 11-1: Calculating a Weighted Sum	• Reading: Ch. 11 • Explorations #: 1,2,3,4,5,6,10 • Quiz 9
11/4 Week 11	Topic 12 (LR): Inductive Reasoning Topic 13 (LR): Deductive Reasoning	• Reading: Ch. 12 & 13 • Ch. 12 Explorations #: 2,3,4,5 • Ch. 13 Explorations #: 2,3,5,8 • Activity Chapter 13-1 #: 1, 2 • Quiz 10
11/11 Week 12	Topic 16 (SR): Averages and Five-Number Summary Excel Activity 16-1: Mean and Median Excel Activity 16-2: Five-Number Summary	• Reading: Ch. 16 • Explorations #: 3,4,6,7,8,9,10,11,14 • Quiz 11
11/18 Week 13	Topic 17 (SR): Standard Deviation, z-Score, and Normal Distributions Excel Activity 17-1: Changing from a Scatterplot to a Column Graph Excel Activity 17-2: Calculating Standard Deviation and z-Scores	• Reading: Ch. 17 • Explorations #: 1,2,3,4,7,9,10,13,15 • Quiz 12 • Project Data Collection, Graphs/Charts
11/25 Week 14	Topic 18 (SR): Basics of Probability Excel Activity 18-1: Simulations	• Reading: Ch. 18 • Explorations #: 2,3,5,6,9,12,14,16 • Quiz 13
12/2 Week 15	Topic 19 (SR): Conditional Probability and Tables Excel Activity 19-1: Sensitivity and Specificity Excel Activity 19-2: 2x2 Tables Excel Activity 19-3: Stacked Column Chart	• Reading: Ch. 19 • Explorations #: 1,2,4,5,6,7,8,9,10 • Activity 19-1 #: 1,2,3 • Quiz 14
12/9 Week 16	Topic 20 (SR): Sampling and Surveys	• Reading: Ch. 20 • Explorations #: 2,3,4,5,6,7,8,9,10 • Quiz 15
12/12 Project	Student Project Presentations	• Project: Written Report Due • Project: Presentation Due

5. Required Text, Readings, and Software

Text: Sevilla A, Somers K. *Quantitative Reasoning: Tools for Today's Informed Citizen*, 2nd edition. Hoboken, NJ: John Wiley & Sons, Inc., 2013.

Other required course materials will be available on Lulima.

Required Software: Microsoft Excel

6. Description of Course Assignments

At the beginning of every week, it is important that you first check your Padlet and the weekly Lulima lesson tab for a summary of assignments to be completed.

Explorations Assignments: Exploration questions give students a chance to apply their understanding of the main concepts to additional real-life situations. These exercises allow students to broaden their problem-solving skills and their understanding of the mathematics involved, thus enabling them to see new contexts for the applications discussed. A set of explorations (sometimes including activity questions at the end of the topic) are assigned weekly and must be completed and uploaded to Lulima Assignments tab via PDF or JPEG image prior to the following Monday at 6:00 a.m. Explorations can be found at the end of the reading for each Topic.

Discussions: Students will take turns leading discussions of the explorations on *Padlet*, an online collaborative website. Padlet discussions will allow students to discuss their solution methods/answers and post questions if they are unsure of how to solve the exploration(s). Students should read/listen/watch all Padlet posts. Discussion leaders will be assigned weekly (check Lulima) and are expected to lead/facilitate the class discussion for their assigned exploration by uploading a video/audio clip explaining the solution to the exploration and/or questions/problems they are having. Discussion leaders must post their audio/video clip by Wednesday 6:00 a.m. of that week. All students (including discussion leaders) are required to upload a video/audio response to **THREE** explorations. Responses must be posted by the following Monday at 6:00 a.m.

Quizzes: Quizzes will be used to assess student's understanding of the topic being covered and will be completed for a grade and will be turned in via the Lulima Tests & Quizzes tab. Quizzes will be opened on the following Monday at 6:00 a.m. and will close two days later on Wednesday at 6:00 a.m.

Excel Activities: Excel activities engage students as critical thinkers by investigating real-life situations using the concepts learned in greater depth. Instructions for the Excel activities will be posted on Lulima. Step-by-step instructions are in the "Activity" section at the end of each topic in your textbook (a PowerPoint tutorial will be uploaded for Mac users). Excel activities must be completed and uploaded to Lulima Assignments tab via excel spreadsheet prior to the following Monday at 6:00 a.m. If you do not have excel, please go to this link and sign up for Microsoft Office 365 using your UH email address so that you can access Microsoft Excel online.
<https://products.office.com/en-us/student/office-in-education>

Project: Each student will complete a project on a research question with either primary or secondary data. Students will be expected to use the skills they acquired in this course to complete their project. Specifics on the project will be given later in the semester. In short, each student must prepare a written research paper and a 10-minute PowerPoint presentation that will take place during a special in-class session.

7. Grading Rubric (For Course Assignments)

	Assignment	Percentage of Total
1.	Explorations	15%
2.	Discussion Leader	15%
3.	Discussion Response	10%
4.	Excel Activities	15%
5.	Weekly Quizzes	15%
6.	Project	30%
	Total =	100%

8. Grading Scale:

This course will use +/- grading system	
A = 90-100	Excellent, distinctive work. Demonstrates sophisticated understanding: Nuanced and insightful account, powerful and effective application of concepts, frameworks and theories discussed in class and articulated in written work. [97-100, A+; 93-96, A; 90-92, A-]
B = 80-89	Above average work. Demonstrates accomplished understanding: Thorough, well-documented account; adequate and apt application of concepts, frameworks and theories discussed in class and articulated in written work. [87-89, B+; 83-86, B; 80-82, B-]
C = 70-79	Average work, sufficient, but not distinctive. Acceptable view with some misconceptions or oversight; not fully supported; acceptable but limited application of concepts, frameworks and theories discussed in class. [77-79, C+; 73-76, C; 70-72, C-]
D = 60-69	Poor, insufficient work. Naïve or inadequate understanding: simplistic account and use of concepts, frameworks and theories discussed in class. Unable to articulate thoughts and ideas in written work. [67-69, D+; 63-66, D; 60-62, D-]
F < 60	Unacceptable work

9. Course Policies:

- Do the assignments on-time.** All students are expected to read the assigned articles/documents on Laulima by the respective dates of discussion, and complete all course assignments at undergraduate-level proficiency. Maximum benefit from this class can be achieved only if you complete the readings, assignments, projects as they are assigned, and actively participate in the class discussions. It is the student's professional responsibility to be aware of the assignment deadlines. Late assignments will not be accepted unless communication has been made before the deadline passes.
- Participate.** All students are expected to participate in the weekly discussions by uploading an audio or video reply to three questions. It is the student's professional responsibility to notify the instructor of any anticipated late work in advance.
- Use the proper format.** All written assignments must be typed with student's name, course number, and date all listed at the top of the page of the assignment. Handwritten assignments must be legible and uploaded to Laulima via PDF or JPEG image. **Please clearly label all PDF or JPEG images.** Submit all assignments by the due date through the Assignments, Tests, and Surveys tab in Laulima system at <https://laulima.hawaii.edu/portal>. If you are uploading a document of spreadsheet, please ensure that your document is Microsoft Word/Excel compatible.
- Grades.** Final grades are based on completed assignments, participation in discussion, weekly quiz grades, and project. All assignments must be completed for a passing grade. There will be no extra credit assignments. Assignments must be submitted on time to Laulima to receive full credit for the assignment. Late assignments will not be accepted. Grades can and will be affected by late or incomplete work.
- Use references wisely.** Original written work is expected with appropriate citation of references, if applicable. All references need to have author, title, year, publishers, place of publishers, journal name, volume and issue number, and page numbers. All written work must follow a consistent citation and referencing style (APA, MLA, Medline, etc.).

6. **Conduct Code—Do original work. Plagiarism is unacceptable** and will result in a failing grade for the assignment and possibly for the course, depending on the extent of the violation. Please be familiar with the University of Hawai'i Student Conduct Code, available online, at the Office of Student Affairs at the Student Services.
7. **Syllabus may be revised as needed.** The course schedule and assignments may need to be revised and some topics re-scheduled depending on the availability of guest speakers, pace of the learning, size of class, and the needs of the students.
8. **Appointments with instructor.** Students are welcomed and encouraged to meet with the course instructor to review their progress, or clarify course assignments and expectations. Please contact the instructor by email to set up appointments.
9. **Demonstration of Professionalism.** Students are expected to conduct themselves with a high level of professionalism throughout the course.

10. Student Learning Objectives (SLOs): (for the Course):

Upon completion of the course, the student will be able to:*

1. Select an appropriate mathematical approach for a given problem or practical application, identify relevant quantities or other information for the selected approach, and verify that the assumptions and limitations of the mathematical approach selected are appropriate for the relevant practical problem [FQ1];
2. Convert relevant quantities/information into the necessary symbolic, numerical, or graphical form as needed for the selected approach [FQ2];
3. Use mathematical approaches successfully, including performing correct chains of algebraic steps, symbolic manipulations, and/or numerical calculations [FQ3];
4. Evaluate the validity of a mathematical approach and its conclusions [FQ4];
5. Communicate final conclusions in appropriate formats [FQ5];
6. Identify, analyze, and solve problems involving quantitative data relevant to public health [PH1];
7. Interpret and communicate the results of quantitative analysis of public health data [PH2];
8. Use technology and internet resources in finding and working with public health data [PH3];
9. Develop and improve numerical intuition and confidence in the ability to engage in quantitative thinking relevant to public health practice, research, and decision-making [PH4].

*FQ=Foundations Quantitative Reasoning SLO; PH=Public Health SLO

11. University Policies for Opportunity and Accommodation:

- **Equal Opportunity and Affirmative Policy**

The University of Hawai'i is an equal opportunity/affirmative action institution and is committed to a policy of nondiscrimination on the basis of race, sex, gender identity and expression, age, religion, color, national origin, ancestry, citizenship, disability, genetic information, marital status, breastfeeding, income assignment for child support, arrest and court record (except as permissible under State law), sexual orientation, national guard absence, status as a covered veteran, pregnancy, and domestic or sexual violence victim status. This policy covers admission and access to and participation, treatment, and employment in the University's programs and activities.

For more information on equal opportunity and affirmative action policies and complaint procedures for the UH Mānoa Campus, contact:

- a) Students: Lori Ideta, Assistant Vice Chancellor & Dean of Students, EEO/AA, Title IX & ADA Coordinator Ph.-956-3290 (V/T); Email idgeta@hawaii.edu
- b) Employees: Mie Watanabe, EEO/AA Director, Title IX & ADA Coordinator Ph. 956-7077; Email - eeo@hawaii.edu
- c) Students with Disabilities: Ann Ito, KOKUA Program Director Ph. 956-7511 (V/T); Email kokua@hawaii.edu

- **Accommodations**

A student who may need an accommodation based on the impact of a disability is invited to contact me privately within the first weeks of the course. I would be happy to work with you and the KOKUA Program (Office for Students with Disabilities) to ensure reasonable accommodations in my course. KOKUA can be reached at 808-956-7511 or 808-956-7612 (voice/text) in room 013 of the Queen Liliuokalani Center for Student Services.

- **Counseling Services and Mental Health**

From time to time, we all need help managing stress and life problems. At times, school can be overwhelming, especially when balancing other responsibilities such as family and work. University of Hawaii at Manoa has a Counseling & Student Development Center (CSDC) that is available to all students.

The phone number is (808) 956-7927.

The website is <http://manoa.hawaii.edu/counseling/>

- **Hawaii Student Conduct Code and Academic Dishonesty**

Academic dishonesty such as plagiarism, cheating and other forms of dishonesty will result in a failing (“F”) grade for the assignment. More than one incident of academic dishonesty will result in failing (“F”) grade for the course. Equally, more than one incident will also result in reporting the academic dishonesty to the UH Office of Judicial Affairs. Student should familiarize themselves with the University of Hawaii Student Conduct Code:

http://studentaffairs.manoa.hawaii.edu/policies/conduct_code/

Accordingly: The university expects students to maintain standards of personal integrity that are in harmony with the educational goals of the institution; to respect the rights, privileges, and property of others: and to observe national, state, and local laws and University regulations.

12a. Linking Mānoa Institutional Learning Objectives for Undergraduate Students that are Addressed:

Keep appropriate ones and delete others.

1. Know -- Breadth and Depth of Knowledge
Students develop their understanding of the world with emphasis on Hawai'i, Asia, and the Pacific by integrating:
1a. General education <ul style="list-style-type: none"> • Arts and humanities • Biological sciences • Languages • Physical sciences • Social sciences • Technology
2. Do -- Intellectual and Practical Skills
Students improve their abilities to:
2a. Think critically and creatively
2c. Communicate and report

12b. Linking Department Approved BA Public Health Competencies Addressed:

Public Health Domains	Competencies: <i>Students should be able to:</i>
Role and Importance of Data in Public Health	<ol style="list-style-type: none"> 1. Identify the basic concepts, methods, and be able to apply qualitative and quantitative tools of public health data collection, use, and analysis in elementary research analyses. 2. Review fundamental statistical concepts and apply them in elementary research analyses.
Project Implementation	<ol style="list-style-type: none"> 4. Exhibit critical thinking and analytical abilities, including the capacities to engage in inductive and deductive thinking, quantitative reason, and to construct sound arguments.
Health Communication	<ol style="list-style-type: none"> 1. Apply abstract reasoning and critical thinking skills to communicate public health research and practice to public and professional audiences.