Basic Principles of Epidemiology
EPID573a
(Fall 2019)

Time: Monday, Wednesday 2:00 – 3:15 p.m.
Location: Health Sciences Innovation Building 640

Instructor Name and Contact Information:
Sydney Pettygrove, PhD
Associate Professor of Public Health
1295 N. Martin
Drachman Hall, A244
Tucson, AZ 85724
Telephone: 626-3704
sydneyp@email.arizona.edu

Instructor Availability: Office Hours: Mondays 12 – 1
signup on Google Spreadsheet via the link in the CRUCIAL INFORMATION
folder on D2L
or by appointment, schedule via email

Teaching Assistant: James Romine
romine@email.arizona.edu

TA Office Hours: To be determined

Catalog Description:
Course will introduce students to the basic concepts and principles of epidemiology and how these concepts are
applicable for their own particular interests and careers in epidemiology related fields.

Course Description:
Through homework, in-class active learning, and a group project, students will gain basic understanding of
epidemiologic research.
Course Prerequisites:
Epidemiology major or minor, MPH major, or consent of instructor.

Course Objectives and Expected Learning Outcomes:

- **Course Objectives**
  During this course students will:
  - compute basic measures such as incidence and prevalence and determine when each is appropriate.
  - synthesize information given in text format to calculate measures of frequency and association and then express the result in text.
  - define standardization of disease or mortality frequencies, explain the context for when standardization is desirable and perform standardization calculations.
  - assess the validity of the methods used in studies reported in the literature.
  - recognize, describe, and control for bias and determine in which direction it will shift results.
  - describe the role of chance in study results.
  - differentiate between screening and diagnostic tests and how to calculate the sensitivity, specificity, positive and negative predictive value of a screening test.
  - justify the importance of and identify basic methods of conducting public health surveillance.
  - identify and describe basic epidemiologic techniques for evaluating the role of genetics in disease etiology.
  - explain the development of epidemiology as a means to study infectious diseases.
  - differentiate between screening and diagnostic tests and how to calculate the sensitivity, specificity, positive and negative predictive value of a screening test.

- **Learning Outcomes:**
  Upon successful completion of this course students will be able to:
  1. Apply epidemiological methods to the breadth of settings and situations in public health practice;
  2. Select quantitative data collection methods appropriate for a given public health context;
  3. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate;
  4. Interpret results of data analysis for public health research, policy or practice.
  5. Select methods to evaluate public health programs
  6. Communicate audience-appropriate public health content, both in writing and through oral presentation

- **Additional Outcomes:**
  1) Search, describe and summarize findings from the scientific literature to describe the epidemiology of a public health problem, identify health disparities and identify risk factors.
  2) Compare the relative strengths and weaknesses of epidemiological study designs, and choose the most appropriate design for specific research questions.
  3) Calculate appropriate measures of disease frequency and excess risk.
4) Recognize and describe potential biases, confounding, and effect modification that can affect epidemiological studies and analyses.

5) Select appropriate study design for assessing the association between a given exposure and an outcome, and then understanding advantages and limitations of these approaches.

6) Critique published research findings

7) Identify potential sources of bias for various study designs and their effect on study quality.

8) Conduct descriptive and analytic analyses, including strategies to assess confounding and effect modification methods, to make statistical inferences.

9) Describe public health surveillance systems and their underlying data sources.

Competencies Covered and Assessed for Each Education Program:

**MPH in Epidemiology (EPI) – In person program**

1. Search, describe and summarize findings from the scientific literature to describe the epidemiology of a public health problem, identify health disparities and identify risk factors.

   **Poster Project** – students select a health condition, research the literature to describe the biology of the condition, the prevalence & incidence, risk factors, and spatial and temporal variations in risk. Students’ findings are presented in an in-class poster session.

2. Compare the relative strengths and weaknesses of epidemiological study designs, and choose the most appropriate design for specific research questions.

   **Problem Set (PS) 6**, questions 6.16 – 6.19 describe the advantages and disadvantages of each of the listed study designs.

3. Calculate appropriate measures of disease frequency and excess risk.

   **PS 2** questions 1-10; **PS 3** questions 1 – 7; **PS 4** questions 1 – 16; **Quiz 2, Quiz 3, Final Exam**

4. Recognize and describe potential biases, confounding, and effect modification that can affect epidemiological studies and analyses.

   **Epi Paper Critique Project** – describe the potential biases that may affect a published study and how this may affect the interpretation of results.

   **PS 9** questions 1-19

5. Interpret these epidemiological analyses in the context of published literature and communicate key findings to various audiences.

   **Poster Project** – students select a health condition, research the literature to describe the biology of the condition, the prevalence & incidence, risk factors, and spatial and temporal variations in risk. Students’ findings are presented in an in-class poster session.

**MS Epidemiology (EPI)**

1. Select appropriate study design for assessing the association between a given exposure and an outcome, and then understanding advantages and limitations of these approaches.

   **PS 6**, questions 6.16 – 6.19 describe the advantages and disadvantages of each of the listed study designs.

2. Identify potential sources of bias for various study designs and their impact on study quality.

   **Epi Paper Critique Project** – describe the potential biases that may affect a published study and how this may affect the interpretation of results.

   **PS 9** questions 1-19

3. Conduct descriptive and analytic analyses, including strategies to assess confounding and effect modification methods, to make statistical inferences.

   **PS 9** questions 1-19; **PS 10** questions 1-7

Rev. July 19, 2019
1. Prepare scientific research or program proposals that articulate specific aims, summarize appropriate background literature, describe study methodology and identify significance and limitations of the approach.

PS 6, questions 6.16 – 6.19 describe the advantages and disadvantages of each of the listed study designs.

3. Design appropriate studies using causal inference principles for testing hypotheses in specific populations, after evaluating specific design advantages and limitations.

Epi Paper Critique Project – discuss advantages and limitations of the design used in a published study and alternative approaches.

4. Evaluate the integrity, comparability, and limitations of data to make inferences related to analyses and results.

Epi Paper Critique Project – describe the potential biases that may affect a published study and how this may affect the interpretation of results.

Required Textbook:


Recommended Textbooks:


Other Readings:

Articles to critique are available on D2L:

For in-class discussion, in preparation for the individual assignment:


Rev. July 19, 2019

**Required or Special Materials:**  
Students will need a laptop, mobile device, or “clicker” with a subscription to the service in order to respond to interactive material during lectures. Quizzes will be administered in class on D2L – students will need a laptop computer to take quizzes. Students who do not own a laptop may check one out from the library for exams: [https://new.library.arizona.edu/tech/borrow/laptops](https://new.library.arizona.edu/tech/borrow/laptops)

**Course Requirements:**

A total of 1,000 points are available. Points will be awarded as follows:

- **Class Participation** – 70 points
- **Problem Sets** – 60 points
- **Projects**
  - Critique of a Questionnaire – 70 points
  - Critique of an epi Paper – 100 points
  - Poster (group project) – 100 points
- **Quizzes**
  - 8 Quizzes – 400
- **Final exam** – 200 points

**Grading Scale/Student Evaluation and Policies:**

- **Class Participation** – students will have the opportunity to earn 1 – 3 points during most lectures by correctly answering questions using clicker technology. Participation in lectures marked as Active Learning will be worth 10 points. Students must be present at the lecture to earn these points – no alternate mechanism will be offered.
- **Problem Sets** – the course includes 12 problem sets, students who submit their completed problem set on time will be awarded full credit (5 points per problem set) otherwise no credit will be awarded. Late problem sets will not be accepted. Official answers for each of the problem sets will become available on D2L 10 minutes after they are due. It is each student’s responsibility to check their answers.
- **Projects**
  - Critique of a questionnaire – students will take the provided questionnaire themselves and administer it to 2 other people (1 male + 1 female) then answer a set of questions about the questionnaire. The questionnaire responses will not be collected. Answers to the questions about the questionnaire will be submitted through a D2L quiz to facilitate grading.
  - Critique of an epi paper – students will choose 1 of 3 epi journal articles and answer a set of questions. Answers will be submitted through a D2L quiz to facilitate grading. Prior to submitting their individual critiques, the class will work together to go through the same set of questions on another paper.
  - Poster (group project) – students will form groups of 5 – 6 to investigate the descriptive
epidemiology of a health condition and present their findings as a set of printed slides (“poster”). Students will be asked to provide feedback on the contributions of each student in their group and some adjustments to scoring will be made if appropriate.

- Quizzes – all quizzes will be held in class and administered through D2L. Questions will include multiple choice, True/False, matching, and open text response.

Students who submit their questionnaire or paper critiques late will be docked 10% for each day (24-hour period) or partial day they are late.

No extra-credit will be offered.

Grades will be assigned as follows:

A: 900 – 1000
B: 800 < 900
C: 700 < 800
D: 600 < 700
E: 500 < 600

Scores will not be rounded. A score of 899.99 will be graded as a “B”.

Students’ final grade is determined by the components listed in the following table. This information is available as a single sheet in the in the CRUCIAL INFORMATION folder on D2L:

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
<th>Due</th>
<th>Points</th>
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<tbody>
<tr>
<td></td>
<td>All Participation</td>
<td>Day</td>
<td>Date</td>
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<td></td>
<td></td>
<td>Sa</td>
<td>9/7</td>
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<tr>
<td>2</td>
<td>PS 01 Patterns/Causation</td>
<td>Sa</td>
<td>9/11</td>
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<tr>
<td>3 Quiz 1</td>
<td></td>
<td>W</td>
<td>9/14</td>
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<td>4</td>
<td>PS 02 Incidence/Prevalence</td>
<td>Sa</td>
<td>9/21</td>
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<td>5</td>
<td>PS 03 More Frequency Measures</td>
<td>Sa</td>
<td>9/28</td>
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<tr>
<td>6</td>
<td>PS 04 Measures of Association</td>
<td>Sa</td>
<td>10/5</td>
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<tr>
<td>7 Quiz 3</td>
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<td>W</td>
<td>10/9</td>
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<tr>
<td>8 PS 06 Study Design</td>
<td>Sa</td>
<td>10/12</td>
<td>5pm</td>
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<tr>
<td>9 Quiz 4</td>
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<td>Sa</td>
<td>10/19</td>
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<tr>
<td>10</td>
<td>PS 07 Outbreak</td>
<td>Sa</td>
<td>10/26</td>
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<tr>
<td>11</td>
<td>PS 08 Odds ratios</td>
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<td>11/2</td>
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<tr>
<td>12</td>
<td>PS 09 Bias, Confound, Interaction</td>
<td>Sa</td>
<td>11/6</td>
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<tr>
<td>13</td>
<td>PS 10 Chance</td>
<td>Sa</td>
<td>11/9</td>
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<td></td>
<td>Quiz 6</td>
<td>W</td>
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Rev. July 19, 2019
Course Schedule: this information is available in a superior, calendar format, suitable for posting, in the Administrative Items folder on D2L.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignments*</th>
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<tbody>
<tr>
<td>1</td>
<td>8/26</td>
<td>Introduction</td>
<td>1,5</td>
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<tr>
<td>1</td>
<td>8/28</td>
<td>Patterns / Descriptive Epi</td>
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<tr>
<td>2</td>
<td>9/2</td>
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<td>2,14,15</td>
<td>PS 01 Patterns/Causation</td>
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<td>Causal Criteria, Measures of Frequency</td>
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<td>9/9</td>
<td>Measures of Frequency cont</td>
<td>PS 02 Incidence/Prevalence</td>
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<tr>
<td>3</td>
<td>9/11</td>
<td>Other Frequency Measures</td>
<td>Quiz 1</td>
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<td>4</td>
<td>9/16</td>
<td>Classification, Measures of Association</td>
<td>3,6</td>
<td>PS 03 More Frequency Measures</td>
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<td>Measures of Association, Epi Study Designs</td>
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<td>5</td>
<td>9/23</td>
<td>Active Learning: 2x2</td>
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<td>PS 04 Measures of Association</td>
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<td>5</td>
<td>9/25</td>
<td>Study Designs, part 2</td>
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<td>9/30</td>
<td>Study Designs, part 3</td>
<td>8,17</td>
<td>PS 05 Vital Statistics</td>
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<td>Study Designs, part 4</td>
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<td>Study Designs, conclusion</td>
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<td>Infectious Disease Active Learning: Study Designs</td>
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<td>10/16</td>
<td>Active Learning: Outbreak!</td>
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<td>9</td>
<td>10/21</td>
<td>Bias</td>
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<td>PS 08 Odds ratios</td>
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<td>9</td>
<td>10/23</td>
<td>Confounding</td>
<td>Quiz 4</td>
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<td>10/28</td>
<td>Confounding, Interaction</td>
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<td>10/30</td>
<td>Interaction, Chance</td>
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<td>11/4</td>
<td>Chance, Standardization</td>
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<td>Standardization, screening</td>
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<td>Standardization</td>
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<td>13/12</td>
<td>PS 09 Bias, Confound, Interaction</td>
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<td>Week</td>
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<td>Readings</td>
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<td>12</td>
<td>11/11</td>
<td>Veteran’s Day – no class</td>
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<td>12</td>
<td>11/13</td>
<td>Screening, genetic</td>
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<td>11/18</td>
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<td>PS 11 Adjustment/Standardization</td>
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<td>14</td>
<td>11/25</td>
<td>Active Learning: FOOTWEAR</td>
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<td>14</td>
<td>11/27</td>
<td>Public Health Surveillance (online lecture)</td>
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<td>Data Sources</td>
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<td>PS 12 Screening</td>
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<td>12/4</td>
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<td>16</td>
<td>12/9</td>
<td>Review</td>
<td>Quiz 8</td>
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<tr>
<td>16</td>
<td>12/11</td>
<td>Poster session</td>
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<tr>
<td>17</td>
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<td><strong>Final Exam 1 - 3pm, Friday 12/13</strong></td>
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</table>

*PS=problem set

Assignments are due on **Saturdays** by 5pm
Quizzes 1 - 6 will be in class on WED after lecture
Quizzes 7 - 8 will be in class on MON after lecture

**Communications**: You are responsible for reading emails sent to your UA account from your instructor and the announcements that are placed on the course web site. Information about readings, news events, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: [https://www.registrar.arizona.edu/personal-information/official-student-email-policy-use-email-official-correspondence-students](https://www.registrar.arizona.edu/personal-information/official-student-email-policy-use-email-official-correspondence-students)

**UA Smoking and Tobacco Policy:**
The purpose of this Policy is to establish the University of Arizona’s (University) commitment to protect the health of University faculty, staff, students, and visitors on campuses and in its vehicles. The official policy can be found at: [http://policy.arizona.edu/ethics-and-conduct/smoking-and-tobacco-policy](http://policy.arizona.edu/ethics-and-conduct/smoking-and-tobacco-policy)

**University Course Policies**: (please see the following URL): [https://academicaffairs.arizona.edu/syllabus-policies](https://academicaffairs.arizona.edu/syllabus-policies)

**Plagiarism**: What counts as plagiarism?
- Copying and pasting information from a web site or another source, and then revising it so that it sounds like your original idea.
- Doing an assignment/essay/take home test with a friend and then handing in separate assignments that contain the same ideas, language, phrases, etc.

Rev. July 19, 2019
• Quoting a passage without quotation marks or citations, so that it looks like your own.
• Paraphrasing a passage without citing it, so that it looks like your own.
• Hiring another person to do your work for you, or purchasing a paper through any of the on- or off-line sources.

**Gender Pronoun Guideline**
It is recommended that instructors address, in one way or another, pronoun usage in their classroom, and that this be done the first day of class. It can be done in a fashion each instructor prefers, but for many, the following statement could work:

“It is already UA policy that class rosters are provided to instructors with a student’s preferred name. Students may share their preferred name and pronoun with members of the teaching staff and fellow students, as desired, and these gender identities and gender expressions will be honored in this course. As the course includes group work and in-class discussion, it is critical to create an educational environment of inclusion and mutual respect. In this class, to be inclusive of all gender identities and expressions, students will be referred to by their first or last names, the pronoun of their choice, or by default, the pronoun “they”.”

The application of this guideline in all instructional settings involving group interactions is strongly encouraged, but the means of carrying it out are left to each faculty member.

**Content Advisory Guideline**
It is recommended that instructors use “content advisories” when assigning certain kinds of course materials. The purpose of these advisories is to alert students to the possibility of unexpected exposure to content evocative of prior traumatic experiences. So alerted, students can talk with the instructor about alternate materials, if such is possible, since students will remain responsible for requirements of the course. The policy is not meant to restrict course content in any way, but to provide ample information about course content in advance, enabling students with legitimate concerns to plan better. Students are encouraged to speak with the instructor at the beginning of the semester prior to course content engagement to voice concerns.