BIOS/EHS/EPI/HPS/PHPM 609 Evaluating the Public Health Literature

Spring 2020

Time: Thursday 12:00 – 12:50 pm
Location: Drachman A119
Credit: 1 unit
Course Director: Joe K. Gerald, MD, PhD
A237 Drachman Hall
geraldj@email.arizona.edu
(520) 626-4678
Preferred Contact: e-mail, response <24 hours in most circumstances
Office Hours: By appointment for involved conversations, immediately before or after class for brief questions, and drop-ins welcome M-F 10A – 4P.
Teaching Assistant: None
Course Prerequisite: permission of instructor


Additional reading will be posted on d2L and may be downloaded from the course website.

Course Description: Concepts for the critical analysis of the scientific literature within public health and the broader field of medicine are reviewed. Topics include understanding the research stream, study design, statistical methodology and the accurate presentation of results.

Course Overview: It has been recently argued by John Ioannidis that, “in modern research, false findings may be the majority or even the vast majority of published research claims.”¹ Even if this claim is overstated, the importance of being a thoughtful and critical consumer of research reports cannot. This seminar emphasizes the critical review and analysis of published articles, policy analyses and opinion pieces relevant to public health practice. Through a series of didactic lectures, student presentations and student assignments, course participants will obtain the knowledge and skills to be able to critically evaluate reports of research evidence published as primary research articles. Emphasis will be placed on the concept of causality in science and the strengths and limitations of the methods used to establish it.

Course Learning Objectives: At the end of the course students will be able to:

- Conduct a systematic review of a peer-reviewed article reporting the results of a research study with an emphasis placed on evaluating the strength of evidence, the potential biases, and implications for future public health practice.

Doctoral Programs of the College and Competencies: The College accrediting body (CEPH) requires each program to identify a set of skills or competencies that should be attained by students participating in the program. This course helps develop skills useful in each of the programs (see examples below).

Doctorate in Public Health: The DrPH is an advanced, professional degree program designed for the student who has a Master of Public Health (MPH) degree or its equivalent and who intends to pursue a leadership career as a public health professional. The DrPH program is unique as it focuses on developing future leaders in public health practice, who will advance the public’s health through the integration and application of a broad range of knowledge and analytical skills in leadership, practice, policy analysis, research, program management and professional communication. Areas of the DrPH in our College and represented independently in this course are Maternal and Child Health & Public Health Policy and Management.

- (D2) Interpret quantitative and qualitative data following current scientific standards.

PhD Biostatistics: This PhD has an emphasis on the foundations of statistical reasoning and requires its graduates to complete rigorous training in applied probability and statistical analyses. This program prepares students who have demonstrated excellence in mathematics and the sciences to become research biostatisticians in academia, industry, or government. Sample competencies addressed:

- Communicate understanding of the assumptions necessary for a given statistical procedure as well as the ability to determine if the assumptions are met for a given data set.
- Demonstrate the ability to communicate effectively in writing reports, giving oral presentations, and teaching basic statistical material in a formal classroom setting.

PhD Epidemiology: This degree trains individuals for careers in research and teaching in academic settings, research institutes, government agencies and industry. It has been designed for students whose careers will focus on conducting investigator-initiated and collaborative epidemiologic research. Competencies addressed include:

- Judges, critiques, synthesizes, and interprets research findings.
- Develops a critical review of the literature.
- Organizes and delivers clear oral presentations of research findings or health issues in varying professional formats.
- Teaches epidemiological and/or biostatistical concepts in seminar, discussion groups, and the classroom.
- Engages competently, respectfully, and professionally with others, including persons from diverse backgrounds.
- Evaluates the integrity, comparability of data, and limitations of data.
• Makes relevant inferences from data analyses and interprets results in a broader public health context.

• Understands and applies guidelines to support the principles of causality.

PhD Environmental Health Sciences. This degree provides field, classroom and laboratory experiences to incoming students with highly varied backgrounds. This health focused program builds on an extensive array of basic sciences, from climate change to toxicology. The program develops leaders for industry, government and academia, committed to research, education and the practice of environmental health sciences. Sample of addressed competencies include:

• To comprehensively review and evaluate the scientific data, and gather and/or analyze preliminary data to develop testable hypotheses, study design(s) and research assessment protocol(s).

• To develop effective external written and oral communication skills for use with the public, government, and other professionals.

• To develop critical thinking and evaluation skills.

PhD Health Behavior Health Promotion. This degree has an emphasis on the biological, behavioral, and socio-cultural determinants of health and health behavior, and the interventions and policies aimed at improving community and population health. The PhD program includes instruction in behavioral sciences, public health practice and policy, human services, and research methods. The doctoral program will offer a diverse and challenging curriculum that addresses health behavior health promotion theory, knowledge/skills in working on health issues within the diverse communities of the Southwest US, mixed qualitative/quantitative research methods, statistics, and grant development skills. Competencies addressed include:

• Identifying theories, concepts and models from a range of social and behavioral disciplines that guide health behavior health promotion research.

• Identifying social, behavioral, biological, cultural and environmental influences, and posit their intersections, that affect healthy lifestyle and wellness of individuals and populations.

• Describing evidence gaps in the research literature on individual and societal benefits of health behavior health promotion interventions and policies.

• Conceptualizing and applying evidence-based approaches to develop, implement or evaluate theory-based health behavior health promotion interventions.

• Conceptualizing novel mixed method (qualitative and quantitative) studies to better clarify, model or address a current health behavioral research challenge.

• Executing (from planning, implementation, data collection, analysis, presentation of results, interpretation within the field) peer-review publication quality health behavioral studies.

Class format: The class will be comprised of in-class presentations, small-group discussions, and individual 1-on-1 mentoring sessions. Structured discussion of selected articles will be emphasized. The mastery of pre-assigned reading is an essential component of successful in-class participation; therefore, students are expected to have read all assigned reading.
Class discussion will be conducted using the Socratic method, a form of inquiry and debate between individuals with opposing viewpoints based on asking and answering questions to stimulate critical thinking and to illuminate ideas. It often involves an oppositional discussion in which the defense of one point of view is pitted against the defense of another; one participant may lead another to contradict him in some way, strengthening the inquirer's own point.

Grading: The seminar is graded A, B, C, D, and E. The grading scale is:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>&gt;89.5%</td>
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<tr>
<td>B</td>
<td>&gt;79.5%</td>
</tr>
<tr>
<td>C</td>
<td>&gt;69.5%</td>
</tr>
<tr>
<td>D</td>
<td>&gt;64.5%</td>
</tr>
<tr>
<td>E</td>
<td>≤64.5%</td>
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Assignments will include:

- **Individual critique of discipline specific peer-reviewed article** (must be completed by March 5th): Each student will be responsible for selecting and discussing a journal article that is directly relevant to their anticipated graduate course of study. The student is required to prepare a <1500 word critique of the article’s introduction, methods, results and conclusions guided by the provided outline (see end of document). Once completed, the student will schedule 1-on-1 mentoring session with the course instructor where the student’s article and written critique will be discussed. Students should be prepared to answer questions and make clarifications during the discussion. The total length of the discussion will be approximately 60 minutes. The presentation will be graded on mastery of the content, sophistication of the critique, and response to questions.

- **Individual critique and presentation of peer-reviewed article** (date TBA): Each student will be responsible for selecting and presenting a peer-reviewed journal article that deploys a methodological technique assigned during the course. The student is required to prepare a 30 – 45 minute Power Point presentation that addresses the general background of the methodology and how well it was deployed by the research team to answer their question. Students should also propose potential alternatives on how the researcher’s question could have been answered. The student will present to the course instructor and peer group. Students should be prepared to answer questions and make clarifications during the discussion. The presentation will be graded on mastery of the content, professionalism of presentation, and response to questions.

- **Journal (group) article critique** (by April 23rd): Student will be assigned to a small group to critique an article assigned by the course instructor. When possible, this article will be one issued by a journal editor as part of the normal peer-review process. Students should prepare a written review that critiques the article’s methodology in order to assess the article’s validity and generalizability. The critique should be no more than 1500 words in length. The following 4 sections should be included: general comments to reviewers, major concerns, minor concerns, and confidential comments to editor.

Class Attendance: While class attendance will not be recorded, attendance is critical to the learning experience as important concepts from the reading and outside materials will be explained and critically analyzed.
Required Statements:

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

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

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

Course Schedule Spring 2020

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Jan 16</td>
<td>Course Expectations, Topic Assignments, Group Formation</td>
<td>Gerald</td>
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<tr>
<td>Jan 23</td>
<td>Why Most Published Research Is False</td>
<td>Gerald</td>
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<tr>
<td>Jan 30</td>
<td>How to Systematically Review an Article</td>
<td>Gerald</td>
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<tr>
<td>Feb 6</td>
<td>Example: Journal club presentation</td>
<td>Gerald</td>
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<tr>
<td>Feb 13</td>
<td>Example: Serving as an Expert Peer Reviewer</td>
<td>Gerald</td>
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<tr>
<td>Feb 20</td>
<td><strong>Presentation 1</strong>: Phenomenology: individuals’ lived experience w/ disease</td>
<td>TBA</td>
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<tr>
<td>Feb 27</td>
<td><strong>Presentation 2</strong>: Case study</td>
<td>TBA</td>
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<tr>
<td>Mar 5</td>
<td><strong>Personal Writing Time-No Class</strong></td>
<td>Paper 1</td>
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<tr>
<td>Mar 12</td>
<td><strong>SPRING BREAK</strong></td>
<td>No Class</td>
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<tr>
<td>Mar 19</td>
<td><strong>Presentation 3</strong>: Diagnostic or screening test</td>
<td>TBA</td>
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<tr>
<td>Mar 26</td>
<td><strong>Presentation 4</strong>: Questionnaire research using cross-sectional data</td>
<td>TBA</td>
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<tr>
<td>Apr 2</td>
<td><strong>Presentation 5</strong>: Cohort or case-control study</td>
<td>TBA</td>
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<tr>
<td>Apr 9</td>
<td><strong>Presentation 6</strong>: Policy analysis using natural experiment</td>
<td>TBA</td>
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<tr>
<td>Apr 16</td>
<td><strong>Presentation 7</strong>: RCT of clinical intervention</td>
<td>TBA</td>
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<tr>
<td>Apr 23</td>
<td><strong>Presentation 8</strong>: Economic analysis using cost-benefit, CEA or CUA</td>
<td>Paper 2</td>
</tr>
<tr>
<td>Apr 30</td>
<td>Wrap-Up</td>
<td>Gerald</td>
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SUGGESTED QUESTIONS TO GUIDE ARTICLE CRITIQUE

Introduction (~20%)
- What is the underlying problem? What is its relevance?
- What is the underlying theoretical construct (may draw diagram)?
- Where does this study fit in the existing research stream?
  - How does this study improve upon the design or generalizability of previous studies and/or advance current theory?
- What is the specific hypothesis?

Methods (~40%)
- Describe the study population?
  - Is it internally valid (participant characteristics are consistent with hypothesis and theoretical construct)
  - Is it generalizable (participant characteristics are representative of a larger, relevant population)?
  - Were the inclusion/exclusion criteria appropriate?
  - Was drop-out or non-response a significant problem?
- Describe the dependent / independent variable?
  - How is it defined (operationalized)?
  - What type of variable is it (categorical, ordinal, interval)?
  - What are its strengths / weaknesses?
- What is the control condition?
  - Is the control group placebo, usual care, or active?
  - What are the strengths and weakness of control group?
  - Would another control condition have been better?
- Did anything unusual happen during the course of the study that might have impacted the study's internal validity (e.g., break in blinding, change in control condition, change in recruitment protocol)?
- What is the specific study design?
  - Experimental/quasi-experimental/non-experimental?
  - Randomized, blinded, cohort, cross-sectional, placebo-controlled, etc.
- What is the statistical analysis? (regression, logistic, descriptive, ANOVA, etc.)
  - Does is seem appropriate (too simple, too complex, etc.)

Results (~30%)
- Is there a demographic table (usually Table 1)? If so, did randomization work? Is the study population consistent with the hypothesis?
- Are there any errors in the key tables? (missing data, numbers that do not add up, etc.)
- Are the results presented consistent with the a priori analytic plan? If not, was the deviation appropriated? Did it bias the study?
- In lay language, what do the study results say/mean?
- Are secondary analysis appropriate or are they misleading?

Conclusion (~10%)
- What is your take away message from the results? Is it consistent with authors’ conclusions? If not, why not?