THE MASTERS PAPER FOR EPIDEMIOLOGY STUDENTS:
2-YEAR EPIDEMIOLOGY/BIOSTATISTICS MPH AND EPIDEMIOLOGY MS

2016-2017

I. GOALS AND DESCRIPTION OF THE WRITTEN PAPER:

Each student in the Epidemiology and Epidemiology/Biostatistics master's program is required to submit a written paper by a given deadline early in the spring semester and to present/defend that paper. Papers submitted by the deadline must be considered final. The defense of the paper in the spring semester in the presence of two or more faculty is designed to meet the requirement of the Graduate Division and the School of Public Health for an oral examination. All students must receive a separate passing grade for the paper and the oral examination in order to receive the MPH degree. More details about the final due date for paper submission and dates and process for the defense will be provided later in the document.

Students can elect to write one of the three types of papers addressing an epidemiological topic:

1) A systematic review
2) A formal meta-analysis
3) An article describing the results of original epidemiologic research that includes secondary data analysis conducted by the student

Regardless of the type of paper written, there are five features that should be common to all the papers submitted to fulfill this requirement:

1) The paper must be original work done by the student
2) The paper must demonstrate that it is built on existing knowledge
3) The paper must demonstrate knowledge of/competence in basic concepts related to epidemiologic research (e.g. study design and analysis, bias, confounding, effect modification, etc.)
4) The paper must make clear the relevance of the topic to health/public health
5) The paper must be well written.

II. DETAILS CONCERNING THE DIFFERENT TYPES OF PAPERS:

A) *Systematic Reviews*

The review should be a concise, systematic and critical review of an existing body of epidemiological knowledge. It should focus on issues of study design and the validity of the inferences that are drawn from the studies. The emphasis should be on a **synthesis and interpretation** of the data and methodologies used, **not** simply a recitation of facts. The paper should **explicitly** discuss the relevance of the subject to current or recommended public health practice/guidelines and research.

Before you select a topic, be sure that there is an established body of published work. A

useful guideline would be the ability to find at least 10-15 references on the topic in peer-reviewed journals. If there is more than one systematic review in the literature, the student must make explicit how this review is different. Although most topics that relate to epidemiology will be suitable, papers that address what are primarily clinical or laboratory issues or factors that affect the delivery of an intervention are not acceptable nor are papers that simply describe the epidemiology of a given disease or condition.

Overall, a systematic review of experimental or observational studies is acceptable as long as there is a clear exposure and a clear health outcome (e.g., disease incidence, morbidity, mortality, etc.) in a population.

All systematic reviews should address the following:

1) The approaches used to identify all literature relevant to the topic, which includes articles and abstracts identified from electronic databases such as PubMed, the bibliographies of articles or from other sources.
2) The precise criteria (and how these criteria were defined) used to include in or exclude for the review (e.g. only English language, papers published after a certain date, certain study designs). When properly detailed, these criteria would lead an independent investigator to include the identical body of literature. A graph showing the selection process is recommended.
3) Identification of methodological strengths and weaknesses in study design and implementation. If you choose to use a quality score, describe and justify what you did.
4) Tables and graphs should be used to maximum advantage to summarize and compare the features, results, and peculiarities/limitations of the studies being reviewed. An additional resource can be found online via**: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA); http://www.prisma-statement.org/**
5) The discussion should address strengths and limitations of evidence and methodologies, implications of the body of evidence for current public health practice/guidelines, and future research needs.
6) Identification of the questions still in need of study after the completion of the meta-analysis and the most reasonable approach (i.e. specific study design) to address these questions.

B) Meta-analysis

A meta-analysis study analyses results from a body of published studies to arrive at quantitative summaries and conclusions about an epidemiological topic. Meta-analyses should specifically address the following points:

1) The approaches used to identify all literature relevant to the topic, which includes articles and abstracts identified from electronic databases such as PubMed, the bibliographies of articles or from other sources.
2) The precise criteria (and how these criteria were defined) used to include in or exclude for the review (e.g. only English language, papers published after a certain date, certain study

designs). When properly detailed, these criteria would lead an independent investigator to include the identical body of literature. A graph showing the selection process is recommended.

3) Identification of methodological strengths and weaknesses in study design and implementation. If you choose to use a quality score, describe and justify what you did.
4) Tables and graphs should be used to maximum advantage to summarize and compare the features, results, and peculiarities/limitations of the studies being reviewed. An additional resource can be found online via**: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA); http://www.prisma-statement.org/**
5) The approach used to abstract data from the previously published work, which includes details of steps taken to blind the student and/or his collaborators to the author and journal of each abstracted article. Appendices to the student meta-analysis should include the data abstraction instruments designed for the study as well as a description of how they were developed.
6) The statistical procedures used to combine the data and the specific approaches used for an estimation of the magnitude of the effect.
7) Detailed explanation of the tests of homogeneity applied to the data and their limitations.
8) Exploration of the variability in the results either qualitatively or through meta-regression.
9) Detailed explanation of the approaches to sensitivity analysis of the meta-analysis results (such approaches may include, but are not limited to, stratification by: study design, quality (of article) score, year of publication, size of study population or re-analysis with serial exclusion of included studies).
10) The discussion should address strengths and limitations of evidence and methodologies, implications of the body of evidence for current public health practice/guidelines, and future research needs.
11) Discussion of the possible limitations of the meta-analysis, with identification of evidence for or against publication bias.
12) Identification of the questions still in need of study after the completion of the meta-analysis and the most reasonable approach (i.e. specific study design) to address these questions.

C) *Results of Original Research*

Students may conduct original epidemiological research and write a paper that describes the results of that work. Students must test a specific hypothesis. The work must be primarily that of the student (i.e. the student should warrant being the first author on a publication that describes the results) and cannot already be published or in press. The epidemiologic research that is described in the paper must be analytic and include multivariable analysis and demonstrated knowledge of biostatistics. Details that relate to the format for such a paper are given below. **Students choosing this option should be advised that it has potential pitfalls. A convincing case must be made in advance that the plan for producing such a paper of high quality and in the time frame available is well conceived.**

III. PREPARATION AND FORMAT OF THE PAPER:

A) General Format

- Regardless of the type of paper written, the text is to be no longer than 20 pages with double line spacing. This page limit does not include tables, graphs, or references. Page margins must be 1" top, right, and left.
- The font size should be 12 points. Any fonts are acceptable. Legibility of text, tables and graphs is important.
- Do not use footnotes either on individual pages or as a list at the end of the text.
- Provide a cover sheet with a title, your name, and the name of the faculty advisor assigned to you for the paper. Please remember to number your pages and **backup up your work to avoid losing the progress you've made.**
- All paper formats should include the following sections labeled as such:
  a) Abstract
  b) Background/Context
  c) Methods
  d) Results (text)
  e) Discussion/Interpretation
  f) References
  g) Tables/graphs

B) Background/Context

This section describes why the question is important, briefly, what is known already (with citations), and at the end of this section, states the research question/hypotheses clearly and concisely.

C) Methods

This section describes how the analysis was conducted. It may vary somewhat according to the type of study, but includes how the individuals or published papers were selected (including loss to follow-up), how variables were measured, and what analytical methods were applied. If it is an original research study that includes human subjects, approvals for research should be documented.

D) Results

Present your study findings here, using a combination of text and tables and graphs. See section G for more information.

The text should not simply reiterate the facts contained in the tables and graphs but should represent a critical discussion or synthesis of the material summarized in the tables and graphs. In general, assume that the reader can see the tables, and repeat on the most important findings from tables or graphs in the results section. The tables are used to summarize material that is not discussed directly in the text, but do not include in the tables material that is not directly relevant to the text.

Be sure to provide citations for all statements based on previous work. It is fine to cite several references for one thought, you do not need to discuss in the text every reference that you cite.

E) Discussion/Interpretation

The discussion should begin with a paragraph summarizing the most important findings. Following paragraphs should highlight and discuss specific findings, weaving in results of previous studies that agree or disagree with the findings in this analysis, and discussing possible reasons why findings agree or disagree. A section on strengths and limitations of the current study is essential. The discussion section should also address gaps in knowledge, suggested new research and end with a conclusion. Recommendations for specific research designs and/or analyses should follow from your critique of the existing body of knowledge. In other words, you should justify your choice of research designs based upon your review. It is not sufficient, for example, simply to restate that a prospective study would be better than a particular set of case-control studies; because, in theory, prospective studies have a number of advantages over case-control studies where causal inference is the goal.

Remember that the objective of this paper is to demonstrate your skill and knowledge of epidemiological and biostatistical methods. Throughout the paper, and particularly in the discussion, do not simply recite basic theoretical epidemiological concepts. Rather, it is important to **apply** the **relevant** concepts to the specific subject that is addressed by the paper.

F) Bibliography

While there is no formal limit on the number of references you can cite, it is rarely necessary for the number of references to exceed fifty. Some journals limit the number of references permitted, so if you are writing your paper with a specific journal in mind, you may choose to consult the author instructions for that journal. The reference format must conform to that used by the American Journal of Epidemiology. Consult the "Instructions to the Authors" provided by the journal in each of the monthly issues for the appropriate format. Students are encouraged to use a reference manager/bibliographic software to organize and maintain references.

G) Tables and Graphs

Tables and graphs should always be placed at the end of the text after the reference list. They should not be interspersed with the text. Tables and graphs should be titled and labeled in a manner that permits them to be interpreted without reference to the text. The combined number of tables and graphs should **not exceed eight.**

H) Writing Skills

The overall quality of writing is expected to be well organized, grammatically correct and convey excellent communication of scientific analysis. In some cases this may require the student to retain outside help from peers or professional writing assistance. The School of Public Health,

along with the Graduate Division, is planning a writing workshop specifically for scientific papers.

Be careful to ensure that all your work is your own. We recommend that you run your paper through WHAT IS THAT SOFTWARE?

Additional resources are:

1) **A Rulebook for Arguments** by Anthony Weston: http://www.amazon.com/gp/product/0872209547/ref=pd_lpo_sbs_dp_ss_1?pf_rd_p=1944687562&pf_rd_s=lpo-top-stripe-1&pf_rd_t=201&pf_rd_i=0872201562&pf_rd_m=ATVPDKIKX0DER&pf_rd_r=19D7RWHKWBA7W88T95DZ---
2) **How to Write and Publish a Scientific Paper, 7th Edition** by Robert A. Day (Author), Barbara Gastel (Author) this does a good job helping writers organize their papers, think through which tense to use in different sections, and what belongs where.

Examples of review articles from previous years are can be obtained from the Epidemiology Division's Student Services Advisor, Janene Martinez in 113 Haviland or via email: jcarolm@berkeley.edu.

IV. FACULTY ADVISING:

Very early in the Fall Semester, each student should find a topic and a divisional faculty member with expertise in the subject matter of the students' proposed paper. This individual may or may not be the student's regular academic advisor. Students can suggest an appropriate advisor (see list below). The student will work with and receive ongoing input from that faculty member during the various stages of planning and writing of the paper. (See deadlines section below.) If a student is having a difficult time identifying an advisor, please consult *Program Head, Mahasin Mujahid, mmujahid@berkeley.edu.*

It is the *student's responsibility* to seek out/make appointments with the identified advisor and to submit various stages of the work to him/her in a timely fashion and well ahead of any deadlines. It is the *faculty member's responsibility* to be available to the students and to provide substantive feedback to the student in a timely fashion. It is expected that you will have at least two appointments with your master's paper advisor to discuss the paper as it develops.

Any student who experiences difficulty making appointments with or receiving timely and substantive feedback from the assigned faculty advisor should immediately bring this problem to the attention of the Program Head, Mahasin Mujahid, mmujahid@berkeley.edu.

V. SCHEDULE OF DEADLINES 2016-17:

A) September 16: Students should have access to data (if conducting an original epidemiologic research paper). For students conducting a meta-analysis or systematic review, be sure to 1) identify and read recent reviews on the topic of choice (to ensure

that your review adds new evidence) and 2)identify at least 10-15 published studies papers that address the study question to ensure that there is an adequate literature to analyze or review.

Please submit the topic area and type of paper planned as described below by email by 5:00PM. Students must submit this information to: jcarolm@berkeley.edu. In the email please include:

1. The specific research question you wish to address. Include a concise statement of the hypothesis.
2. Whether this is a project on which you have been working or whether this is a new area/subject for you.
3. The name of an advisor, if you have already arranged for a specific advisor.
4. Project type:
    a. Systematic review
    b. Meta-analysis
    c. Results of original research

B) October 14: Students submit directly to their assigned advisors 1) an annotated bibliography of at least 10 background articles for your topic. The annotation should be a short paragraph that indicates why that reference is relevant to the topic. 2) and an outline of the proposed paper. If the paper is a systematic review or meta-analysis, also include a bibliography of the papers you intend to assess or analyze. If the paper is original research, provide a draft data analysis plan. 3) Include a list of questions that you can discuss with your advisor.

C) November 11: Students submit, directly to their advisors, a 3-4 page summary with refinement of issues from the last draft. Submit draft tables summarizing your progress to date. Include a list of questions that you would like to discuss with your advisor.

D) **December 16:** Students submit, to their advisors, a first draft of text, tables and bibliography (at least 10-15 pages)

E) **January 20, 2017:** Deadline for faculty advisor to return first draft with detailed comments.

G) Final paper due: **February 17, 2017** ***(note: all dates are Fridays)***

IMPORTANT: Additional meetings between students and their faculty advisors can be arranged at the discretion of the student or the faculty member. Please work out the best way to get feedback with your advisor. Generally, minimum of two meetings with advisors is strongly recommended, as is liberal use of email. Please note that students should be in clear communication with their advisor throughout the process and create a detailed timeline with the advisor. Advisors may change some dates in which they want

to receive drafts from students and in which they provide feedback. However, all dates in which materials are due to Janene are non-negotiable.

THE MASTERS PRESENTATION

Students will present their masters papers to their peers and at least 2 faculty members during the spring seminar (PH 292). An electronic copy of each paper presented will be forwarded by Janene Martinez at least one week before each scheduled presentation. Here are guidelines for the presentation:

1) You are allotted 30 minutes in total for your presentation and question and answer period. This includes:

    a. Ten minute student presentation of key points of the paper. A projector will be available in the classroom so that you can use slides that accompany your presentation. You may also address or correct any issues that you have thought about since submitting your paper. Your presentation will be timed by one of the faculty members. You will be asked to stop at 10 minutes. Be sure that your presentation does not exceed the time limit.

    b. Ten minute questions by faculty examiners

    c. Ten minute questions and critiques of the paper by other students.

    d. You may invite any other faculty or students to attend.

2) You will NOT be notified immediately after the session whether you have passed. You will receive an email from Janene within 3-4 days with the results.

3) Two separate "passes" are required: one for the paper, and one for the oral exam. If you do not pass, you will be asked to rewrite your paper and respond to the concerns and/or take a second oral examination. Possible Determinations:

    - Pass: If both the paper and the oral exam are adequate
    - Partial pass: Either the paper is ok but oral is not, or vice versa
    - Fail: If both the paper and the oral exam are inadequate

4) If the student receives a partial pass or fail, they will have an opportunity to revise the paper and/or retake the oral exam within one month of their examination date. If that paper is considered failing, the committee can recommend that the student have a second and final opportunity to provide a revised paper and/or exam.

The last opportunity for the presentation/oral exam will be scheduled in mid-late April. If you do not pass your comprehensive exam by then, you will not graduate. You will either need to register for a summer session and identify two faculty members who are available during the summer to conduct your examination, or you will need to register for following fall semester and take your exam then. Either way, you will receive your degree in December instead of May.

Prospective Masters Paper Advisors for Epidemiology and Epi/Biostat Students

Abrams, Barbara, DrPH, RD, Professor, Epidemiology
Ahern, Jennifer, PhD, MPH, Assoc. Professor, Epidemiology
Aragon, Tomas, MD, DrPH, Asst. Adj Professor, Epidemiology
Balmes, John, MD, PhD, Professor in Residence, EHS
Barcellos, Lisa, PhD, Professor, Epidemiology
Bates, Michael, PhD, Adj Professor, Epidemiology
Bauer, Heidi, MD, MS, MPH, Assoc Adj Professor, Epidemiology
Bradshaw, Patrick, PhD, Asst Professor, Epidemiology
Chokkalingam, Anand, PhD, Asst Adj Professor, Epidemiology
Colford, Jack, MD, PhD, MPH, Professor, Epidemiology
Dudoit, Sandrine, PhD, Professor, Biostatistics
Eisen, Ellen, ScD, Adj Professor, EHS
Ekstrand, Maria, PhD, Assoc Adj Professor, Epidemiology
Eskenazi, Brenda, PhD, MA, Professor, Epidemiology
Fernald, Lia, PhD, MBA, Professor, CHS
Harley, Kim, PhD, Assoc Adj Professor, MCH
Hubbard, Alan, PhD, Professor, Biostatistics
Jagust, William, MD, Professor, Public Health
Jewell, Nicholas, PhD, Professor, Biostatistics
Kaskutas, Lee, DrPH, Assoc Adj Professor, CHS
Laraia, Barbara, PhD, MPH, RD, Assoc Professor, CHS
Marshall, John, PhD, Asst Professor in Residence, Biostatistics and Epidemiology
McCoy, Sandi, PhD Asst Adj Professor, Epidemiology
Metayer, Catherine, MD, PhD, Assoc Adj Professor, Epidemiology
Minnis, Alexandra, PhD, MPH, Asst Adj Professor, Epidemiology
Mujahid, Mahasin, PhD, MSc, Asst Professor, Epidemiology
Nuru-Jeter, Amani, PhD, MPH, Assoc Professor, Epidemiology, CHS
Ozer, Emily, PhD, Professor, HSB
Petersen, Maya, MD, PhD, Assoc Professor, Biostatistics and Epidemiology
Reingold, Arthur, MD, Professor, Epidemiology
Riley, Lee, MD, Professor, Infectious Disease and Vaccinology
Sagiv, Sharon, PhD, Asst. Adjunct Professor, Epidemiology
Steinmaus, Craig, MD, PhD, MPH, Asst Adj Professor, Epidemiology
Syme, S. Leonard, PhD, Professor Emeritus, Epidemiology, CHS
Van der Laan, Mark, PhD, Professor, Biostatistics