

**Thesis Writing and Communication in Genetics 01:447:414  
Fall Semester 2020**

**COURSE SYLLABUS**

Revised Sept 5, 2020 (subject to revision)

**Course number:** 01:447:414 (1.5 cr)  
**Class location:** Remote, Zoom Meeting ID: 940 3007 2013, Passcode: 142354  
<https://rutgers.zoom.us/j/94030072013?pwd=aWtiM3VKMIRNTjd0UTVnMHc5bGdLdz09>  
**Class meeting times:** Wednesday 10:20-11:40 AM, Remote, Zoom  
**Canvas site:** [canvas.rutgers.edu](https://canvas.rutgers.edu) (Course management system)  
**Instructor:** Dr. David Axelrod, Department of Genetics, Rutgers University  
Rm. B341 Nelson Biolabs (Busch), 848-445-2014 (Closed)  
Email: [axelrod@biology.rutgers.edu](mailto:axelrod@biology.rutgers.edu)  
**Office hours:** Tuesday and Thursday 3:15-3:45 PM, Remote, Zoom  
Meeting ID: 978 5503 3318. Password: 004886  
<https://rutgers.zoom.us/j/97855033318?pwd=c0gvQUVHMWdOc1hGSXZ0b3h5TDILUT09>

**Course Description:** Communication is an essential part of science. Whether it is communicating research findings to other scientists or conveying complex concepts to a lay audience, a scientist must have effective communication skills in order to succeed. Communication in science is typically through publications, posters, or oral presentations. The goal of this course is provide students with guidance and practice in effectively communicating scientific findings, with particular emphasis on the writing parts of their Honors thesis, and explaining their research orally.

**Course Goals:** Students are expected to:

- Write part of an Honors Thesis in the style appropriate for publication in a journal in the field of genetics, or in the style of a research proposal appropriate for submission to a funding agency. Such articles typically include at least the following: Title, Abstract, Introduction, Materials and Methods, Results, Discussion, Acknowledgements, and References. The Results, Discussion, and Acknowledgements sections will not be part of the Final Report for this Fall semester course; they will be the subject of the second semester course and the complete Thesis.
- Find relevant research articles and reviews in the published literature. Use online databases such as Medline/PubMed for backward searches and Web of Science Cited Reference Search for forward search. Use the articles as the basis for writing the Introduction.
- Make an oral report of your work in the format of an interview, similar to an interview as part of an application to medical school, graduate school, or for a job in academia, industry, or government.

**SAS Core Learning Goals Satisfied by the 447:414-415 combination:**

WCr- Respond effectively to editorial feedback from peers, instructors, and/or supervisors through successive drafts and revision

WCd- Communicate effectively in modes appropriate to a discipline or area of inquiry.

**Departmental Learning Goals:**

- Use genetic information and ideas to critically analyze published research articles in genetics
- Design, conduct, analyze, and interpret experiments using appropriate laboratory techniques
- Effectively incorporate critiques from peers and faculty in their revision of written and oral communication
- Effectively describe their research, using relevant discipline-specific terminology with precision, accuracy & purpose
- Accurately and effectively present advanced scientific concepts through oral presentations.

**Optional Textbooks:**

*Scientific Writing and Communication: Papers, Proposals, and Presentations, 2<sup>nd</sup> edition.* Angelika H. Hofmann, Oxford University Press, Second edition, Oxford University Press, 2014; ISBN: 9780199947560). On reserve at the Library of Science and Medicine, call number Q223.H63 2014.

*The Elements of Style, 4<sup>th</sup> edition,* Strunk, W. and White, E.B., Pearson Educational Limited, 2014; ISBN: 9780205309023.

**Course Purpose:** This is the first of two one-semester courses titled *Thesis Writing and Communications*. By the end of this semester students will have written a Thesis Draft. This draft will contain several parts of their Honors Thesis, including the following: Title Page, Table of Contents, Abstract, Introduction, Materials and Methods, Bibliography of references, Figures and Tables, and Appendix (Glossary, etc.). During the second semester, they will complete their Honors Thesis by revising previous sections and including the Results, and Discussion. The entire thesis will go through multiple drafts, with edits from the Instructors.

**Course Expectations:** This is a course in effective communication in the area of genetics. It includes multiple written assignments and an oral presentation. This course is not a repeat of the English Department's Expository Writing course. A major part of the thesis is an Introduction section. It will include a critical summary of relevant published research articles, and will use that summary to provide a persuasive argument that the student's proposed work is feasible, novel and important. Other items for the thesis are listed separately. Students are expected to attend and participate in every class. Students will be responsible for material presented in class, and any instructions or Syllabus revisions announced in class and/or sent to the students by email or posted on Canvas.

**Students' Expectations:** Students will (1) read published research articles and review articles in order to provide a basis for other parts of their Introduction; (2) write an Introduction modeled appropriate for a Research Proposal, a Materials & Methods section modeled after such sections in research articles, and other sections; (3) respond to critiques the their written work; and (4) revise what they have written in response to the Instructor's critiques. Each week's task should be completed as described in the Assignments section. Students are expected to attend and participate in each remote class, and to submit correctly formatted Assignments to Canvas before the due date and time.

**Instructor's Expectations:** The instructor will not teach how to write with correct English grammar. Rather, the instructor will discuss published scientific articles as examples, will help to organize the content related to the student's Thesis, will provide written critiques, and will provide the opportunity to revise material for each portion of the draft. The Instructor will also demonstrate oral presentations in the form of interviews that would be part of an application for medical school, graduate school, or for a job.

**Format:** During each class, the Instructor will give a lecture, ask questions, and lead a discussion of the assigned topic. The lectures will be synchronous live with the Instructor sharing his screen of PowerPoint lectures or additional material, and discussion with students using Zoom. The Zoom recurring join meeting URL will be available before the scheduled lecture on the Canvas website as an Announcement. The PowerPoint slides for the lecture will be available before the lecture on Canvas. The Instructor's live lectures will be recorded for access on Canvas after the lecture. Office hours for students live discussion with the Instructor will be held on Tuesday and Thursday 3:15-3:45 PM, they will not be recorded.

**Technology:** Students are expected to view and participate in each class using Zoom, Wednesday 10:20-11:40 AM. A desktop or laptop computer with a webcam and audio capability, and internet access are necessary. Browsers adequate include Firefox, Chrome, and Safari. The join meeting URL for Zoom will be available on the course Canvas site as an Announcement and sent to students' default email address (if it hasn't been changed in Notifications). Information about Canvas and about Zoom can be found at the URLs listed below. Computer technical help is available from the Office of Information Technology, Email: [help@oit.rutgers.edu](mailto:help@oit.rutgers.edu) or by phone [833-OIT-HELP](tel:833-OIT-HELP)

**Canvas:** <http://canvas.rutgers.edu>

The Learning Management System (LMS) Canvas will contain the following items in the Files tab: Syllabus including schedule of topics, and Assignments in Canvas with dates due, lecture slides available before the lecture, recordings of live Zoom classes, and files with additional information. Student's work will be submitted to Canvas as Assignments. Announcements will include the recurring meeting ID, Passcode, and URL to access the live Zoom lectures and discussions. A student guide to Canvas is available at:

<https://canvas.rutgers.edu/students/getting-started-in-canvas-students/>

**Zoom:** Lectures and discussions during class will be synchronous, and live, using Zoom. The recurring join meeting Meeting ID, Passcode, and URL for accessing the class on Zoom will be available as an Announcement on the course Canvas site and sent to students' email. Lectures will be recorded and available for viewing after class on the course Canvas site. A short video on how to join a Zoom meeting can be found at:

[https://www.youtube.com/embed/hlkCmbvAHQQ?rel=0&autoplay=1&cc\\_load\\_policy=1](https://www.youtube.com/embed/hlkCmbvAHQQ?rel=0&autoplay=1&cc_load_policy=1)

## ACADEMIC INTEGRITY POLICY

<https://policies.rutgers.edu/10213-currentpdf>.

Accessed June 22, 2020

**Honor Pledge:** To create a strong culture that promotes academic integrity, Rutgers has adopted the following honor pledge to be written and signed on examinations and major course assignments submitted for grading: ***On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.*** Participating in this class remotely, including submission of Assignments, will be the equivalent to writing and signing the Honor Pledge.

**Cheating:** The use or possession of inappropriate or prohibited materials, information, sources, or aids in any academic exercise. Cheating also includes submitting papers, research results or reports, analyses, and other textual or visual material and media as one's own work when others prepared them.

**Academic Penalties:** Any violation of academic integrity is a serious offense subject to appropriate sanctions or penalties. Violations of academic integrity may result in academic penalties, educational sanctions, and/or disciplinary sanctions... including but not limited to the following, a grade of F in the course, suspension for one or more semesters, expulsion from the University with a permanent notation of disciplinary expulsion on the student's transcript.

**Grades:** Grades will be based on student performance on homework Assignments. Percent contribution of each Assignment towards the final course grade are indicated on the Schedule of Classes and Assignments. Grades will be calculated based on overall course performance. The following grading scale will be used: 90% A, 85% B+, 75% B, 70% C+, 60% C. The Instructor reserves the right to modify the grading scale downward (e.g., making the lowest A an 88%), but will not adjust the grading scale upward. Grades below "C" will be determined based on the final score distribution at the end of the course. Points will be taken off for not following instructions or not meeting deadlines!

**Penalties for Late and Mis-formatted Assignments:** Assignment deadlines are clearly indicated on the description of Assignments, and on the Schedule of Classes and Assignments. Each Assignment is due before the beginning of the class (10:20 AM). Late assignments will be penalized 10% of the total grade for that assignment on the first day it is late, and another 10% for each additional 24-hour period past the deadline. Even one minute late counts as late! Don't wait until the last minute to submit an assignment. Internet connectivity problems or problems with Canvas will not be accepted as an excuse! It is each student's responsibility to confirm that each assignment has been successfully submitted.

Formatting is an important component of publications, presentations, and theses. Students will lose points for failing to adhere to formatting guidelines. It is not unreasonable for an assignment to suffer a 10-20% penalty due to errors in formatting or failure to follow instructions.

### **Information for Student-Wellness Services:**

#### **Just In Case Web App** (<http://codu.co/cee05e>)

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

#### **Counseling, ADAP & Psychiatric Services (CAPS)**

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901. / [rhscaps.rutgers.edu/](http://rhscaps.rutgers.edu/)  
CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

#### **Violence Prevention & Victim Assistance (VPVA)**

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / [vpva.rutgers.edu/](http://vpva.rutgers.edu/)  
The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

#### **Disability Services**

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 (<https://ods.rutgers.edu/>)  
The Office of Disability Services works with students with a documented disability to determine the eligibility of reasonable accommodations, facilitates and coordinates those accommodations when applicable, and lastly engages with the Rutgers community at large to provide and connect students to appropriate resources.

#### **Scarlet Listeners**

Peer counseling. Get things off your chest in a non-judgmental, empathetic space facilitated by trained students. Sessions held Monday-Thursday evenings during the Fall and Spring semesters. Sign up for information about times and locations at:

[tinyurl.com/SLGroupSessions](http://tinyurl.com/SLGroupSessions) or email [scarlet.listeners@gmail.com](mailto:scarlet.listeners@gmail.com).

#### **Psychiatric Emergency**

(848) 932-7884 (8:30AM-4:30PM, Monday-Friday). (855) 515-5700 (after 4:30 and on weekends)

## GUIDELINES

**A Note About Thesis Guidelines:** The format of the thesis drafts submitted for this course should follow the “Thesis Guidelines” provided in the Resources section of the course Canvas site. These are the same as the Thesis Guidelines that appear in the Genetics Major’s Student Handbook. A MS-Word docx file has been provided that has the appropriate style and formatting that students may use as a starting template.

### **Final Thesis Guidelines, from the Genetics Major’s Student Handbook**

- Title Page
- Acknowledgements Page (optional)
- Table of Contents
- Abstract (limited to 1 page)
- Introduction, typically 15-20 pages, broken into sections with subheadings)
- Materials and Methods (5-10 pages)
- Results (10-20 pages)
- Discussion (5-10 pages)
- Appendix (optional, could be anywhere from 1-20 pages)
- References (typically 5-15 pages, perhaps 50-100 references, with the majority being primary references. i.e., not reviews)

### **Thesis Draft Guidelines, Fall semester in Bold. Notice changes \* from above.**

- **Title Page**
- Acknowledgements Page (optional)
- **Table of Contents**
- **Abstract (limited to 1 page)**
- **Introduction (minimum of 10 \* pages, broken into sections with subheadings)**
- **Materials and Methods ( \* as appropriate)**
- Results (10-20 pages)
- Discussion (5-10 pages)
- **Appendix (optional, could be anywhere from 1-20 pages)**
- **References (minimum of 25 \*, with the majority being research articles, not reviews)**

(Con’t)

**Sections of Assembled Thesis Draft, Fall Semester**

1. Title Page
  - Format in Guidelines in the Genetics Majors Student Handbook
2. Table of Contents
  - Format in Guidelines in the Genetics Majors Student Handbook
3. Abstract, limit one page, with subsections
  - 3.1 Background
  - 3.2 Hypothesis or Questions
  - 3.3 Objective
  - 3.4 Methods
  - 3.5 Possible results
  - 3.6 Significance
4. Introduction, minimum 10 pages with subsections:
  - 4.1 Critical review of published research literature in an area of interest to you being carried out by your Research Mentor,
  - 4.2 Identification of open questions,
  - 4.3 Specific Aims. List of 1 to 4 goals that you intend to accomplish, and for each:
    - 4.3.1 What question you intend to answer or hypothesis intend to test
    - 4.3.2 What is the rationale or motivation
    - 4.3.3 What information you intend to obtain
    - 4.3.4 How you will accomplish that Specific Aims
  - 4.4 Development of an argument that your proposed research is
    - 4.4.1 Significant
    - 4.4.2 Innovative
    - 4.4.3 Feasible
5. Materials and Methods
  - Subsections for each Specific Aim
6. Bibliography (=References)
  - Minimum of 25, formatted for an indicated journal. Includes all Authors' last name and initials, article title, journal name or abbreviation, volume number, first and last pages.
  - Some journals also require the following: issue number, URL, doi, and/or PMID.
7. Appendix
  - Glossary
  - Supplementary material (Optional)

**For students doing remote computational research with a Faculty Research Mentor:**

The student's Research Mentor may request a different format for a different end-of-semester report submitted to the Research Mentor for 447:408; however, the Thesis Draft submitted for this course must adhere to the guidelines for this course.

*During the Fall Semester*, Thesis Writing 447:414, you will write drafts of the following sections of your Thesis: Title Page, Table of Contents, Abstract, Introduction, Materials and Methods, Appendix, References.

The Title Page and the Table of Contents should follow the format in the Thesis Guidelines, from the Genetics Major's Student Handbook on the Department of Genetics website.

The Abstract will include the following subsections: Background, Hypothesis or Questions, Objective, Methods, Possible results, Significance.

The Introduction will include the following subsections: Critical review of published research literature in an area of interest to you being carried out by your Research Faculty mentor, Identification of Open Questions, Specific Aims, Development of an argument that the proposed research is significant, innovative, and feasible.

The Materials and Methods section will include subsections on strategies to accomplish each of the Specific Aims.

The Appendix should include a glossary of terms, and supplementary information.

*During the second semester*, Thesis Writing 447:415, you should follow the instructions of the Instructor for that course. At the time this Syllabus is written (Aug.23, 2020), it is expected that you will write the Results and Discussion Sections of your Thesis based upon your research. You should also revise the Thesis Draft that you submitted during the first semester to make a complete Final Thesis.

**For students not allowed to do wet lab research in the Fall semester because of the pandemic:**

It is expected that each Honors Student will have a Research Mentor. Some Honors Students will have had some laboratory research experience, but because of the pandemic may not be able to complete their research. Other Honors Students will have had little or no laboratory research experience. The formats of the Honors Thesis, and the format of this course Thesis Writing and Communication have been designed to accommodate students in each of these situations.

The student's Research Mentor may request a different format for a different end-of-semester report submitted to the Research Mentor for 447:408; however, the Thesis Draft submitted for this course must adhere to the guidelines for this course.

*During the Fall Semester*, in Thesis Writing 447:414, you will write a Thesis Draft in the form of a Research Proposal similar to that submitted by faculty to the National Institutes of Health or to non-government organization that also funds biomedical research, such as the American Cancer Society. It will include the following sections: Title Page, Table of Contents, Abstract, Introduction, Materials and Methods, Appendix, References.

The Title Page and the Table of Contents should follow the format in the Thesis Guidelines, from the Genetics Major's Student Handbook on the Department of Genetics website.

The Abstract will include the following subsections: Background, Hypothesis or Questions, Objective, Methods, Possible results, Significance.

The Introduction will include the following subsections: Critical review of published research literature in an area of interest to you being carried out by a Genetics Faculty member, Identification of open questions, Specific Aims, Development of an argument that the proposed research is significant, innovative, and feasible.

The Materials and Methods section will include subsections on experimental strategies to accomplish each of the Specific Aims.

The Appendix should include a Glossary of terms, and supplementary information.

*During the Spring semester*, Thesis Writing course 447:415, you should follow the instructions of the Instructor for that course. At the time this Syllabus is being written (Aug. 23, 2020) it is expected that you may not have sufficient research results to write the Results and Discussion sections just on your own lab research. In that case you will write the Results and Discussion section, not on only your own wet lab research, but rather (or also) about research that you propose. It will be similar to sections of a Research Proposal submitted by faculty to the National Institutes of Health or to non-government supporters of biomedical research such as the American Cancer Society. The Results section may include the following for each Specific Aim: Questions to be answered, Rationale, Experimental Approach, Anticipated Possible Results, How to Analyze and Present Results, Potential Problems and How to Deal with Them. The Discussion section may include the following: How the possible results could satisfy each of the Specific Aims, Anticipated Results in the context of the relevant published literature reviewed in the Introduction, Significance, and Relation to Public Health. You should also revise the Thesis Draft that you submitted during the first semester to make a complete Final Thesis.



## SCHEDULE OF CLASSES

### Week 1, Sept 2: Introduction to the Course, Parts of the Thesis Draft

#### *In class:*

The Instructor will describe the course learning goals, expectations (completion of thesis, preparation of oral interview), and course format (lectures, relaxed discussion and interaction, student interviews).

The Instructor will review and discuss the overall organization and sections of the Thesis Draft.

The outcomes of this semester will include an Honors Thesis Draft with the following sections: Title page, Table of Contents, Abstract, Introduction, Materials and Methods, References, Figures and Legends, Tables, and an Appendix (Glossary, and other optional material).

In addition, there will be an Interviewee Form and an oral presentation in the form of an Interview that would be part of an application for medical school, graduate school, or for a job.

Assignments will be submitted to Canvas in the MS-Word (docx) format.

#### *Out of Class:*

Students should review the PPT from today's class (Intro to Course, Parts of Thesis) and "Thesis Guidelines." Read "Using Microsoft Word Styles Function" and download the three thesis template docx files.

Students should request from their Research Mentor two research articles and two review articles related to their thesis research.

Students should download from the course website and read the file "Course Expectations and Grading Guide for 01:447:408 Honors in Genetics Fall Semester". Students should forward a copy of the file to their Research Mentor at the beginning of the semester, and again one week before the end of the semester. It includes information about Expectations of the Student, instructions for the Mentor Evaluation of the Student, and Suggested Grading for the 408 course using the "Mentor Evaluation" form with "Guidelines for Student Assessment Using Rubrics". The grading for the Thesis Writing 414 course, and grading for the Honors Research course 408 are separate.

### Week 2, Sept 9: Searching the Published Literature

#### *In class:*

The instructor will demonstrate how to search for published articles relevant to their Thesis research using the Rutgers Library's Ovid interface for the Medline database of biomedical literature, and the Web of Science Cited Reference Search.

The Instructor will demonstrate how students can email to themselves from Medline the complete citation, including Author, Title, Citation, Abstract, and MeSH Subject Headings (Medical Subject Headings = key words), and other information; and how to export citations to EndNote, or other citation managers.

#### *Out of class:*

The students should write a 500-word essay summarizing the two research articles and two review articles obtained from their Research Mentor, and describing how they relate to the student's own thesis project. All four articles and the essay will be due as **Assignment 1 submitted to Canvas before Sept. 16, 10:20 AM.**

Students should use the Medline database to search the published literature for at least 25 research articles related to the research articles and review articles obtained from their Research Mentor, and to the student's research topic. The students should send emails to themselves of the complete citations and abstracts. These will be used in future assignments for the Introduction.

### **Week 3, Sept 16: Managing Citations, Constructing a Bibliography of References**

*In class:*

Instructor will demonstrate how to install EndNoteX9 citation manager tool, create an EndNote account, log in to the EndNote citation manager system, install “Cite As You Write”, download citations from Medline/Ovid and Web of Science, and format citations for the Reference section (Bibliography) according to a selected journal.

*Out of class:*

Students should review the EndNoteX9 support documents on the course Canvas site.

Students should install EndnoteX9 on their own computer. Step by step instructions for installation of EndnoteX9 on Mac or Windows, and video tutorials can be found at

<https://www.libraries.rutgers.edu/endnote> .

Students should go to the URL <https://libguides.rutgers.edu/endnotetutorials/introduction>. It will take you to the Home tab. Read material on the following tabs: EndNoteX9, How to Create a Library, How to import References from a Database, How to Cite While You Write (CWYW).

Students should create an EndNoteX9 account, practice downloading citations from Medline, and practice formatting citations.

Students should use the Web of Science Cited Reference Search, to find articles that have cited the two research articles and two review articles since they were published. This will update the list of articles found on Medline that cited related articles (similar MeSH) before they were published. These articles should be added to the student’s library. Building from these searches, students should compile a list of at least 25 articles that seem most cogent to their project. No more than 10 of these may be reviews.

Students should select a journal in their field that requires complete citation information, see page 6, item #6. Use EndNoteX9 to format the list of articles for the selected journal. The Preliminary Bibliography (list of formatted articles), with the name of the selected journal, and relevant MeSH Subject Headings should be **submitted to Canvas as Assignment 2 before Sept. 23, 10:20 AM.**

### **Week 4, Sept 23: Creating an Outline, Writing a Preliminary Abstract**

*In class:*

The Instructor will convey the importance of constructing an outline of sentences of the Introduction rather than plunging ahead and writing detailed text. It is a way of organizing your thoughts, indicating what is most important, and how your argument can be persuasive. The purpose of the outline is to provide a framework for the subsequent details. The outline will highlight that the Introduction is more than a summary, and more than a critical review of published research. The Introduction is also an argument that the proposed work is important, novel, and feasible.

The suggested topic sections of the outline might include a prolog, summary mentor’s research, critical review of the published literature, and context of the student’s research. It should also include open questions, specific aims, approach, and argument for significance, innovation, and feasibility.

The Instructor will describe and provide examples of an Abstract. The Abstract should be one-half to one page with sentences organized with each of the following subheadings: Background, Hypothesis or Questions, Objective, Methods, Possible Results, Significance.

*Out of class:*

Students should write the Outline and Preliminary Abstract. This Preliminary Abstract may be revised later in the course. The Outline and Preliminary Abstract should be submitted to Canvas **as Assignment 3 before Sept 30, 10:20 AM.**

### **Week 5, Sept 30: Introduction: Reviewing the Published Literature, Writing a Critical Summary**

*In class:*

The Instructor will lead a discussion of several key questions about their project: Who is your audience? What do you need to tell your audience so that they understand why what you are proposing is important, novel and feasible? What questions are you trying to answer or what hypotheses do you intend to test? Why is the question important? How will answering it move the field forward? What is already known? What is not known? What approaches (logic and methods) will you be using? What alternatives? Is there an advantage to your approach over that of others?

The Instructor will indicate how the review of the published literature can be more than paraphrases of published abstracts. It should have selected information bearing on the problem to be investigated. It should include ideas as well as methods that have been used to further a relevant field. It should inform the reader about the specific background information that the reader needs to know to understand the problem. It should indicate what aspects of previous reported observations and conclusions are reliable and what may be questionable or in need of further investigation. It should highlight avenues of research that are the immediate precursor or basis for the student's further investigation.

*Out of class:*

The students should write a summary and critical review of relevant research published in the articles compiled in Week 3, and **submit them it as Assignment 4 to Canvas before Oct 7, 10:20 AM.**

### **Week 6, Oct 7: Introduction: Identifying Open Questions**

*In class:*

The Instructor will indicate how the summary and critical review of the relevant published research can lead the framing specific questions or hypotheses. Framing specific questions or hypotheses helps the investigator to organize their ideas. The questions or hypotheses will focus the reader's attention on what the proposed work is intended to accomplish. There are several kinds of questions, some are intended to resolve an existing controversy, some to provide new information to illuminate an established field, and others to open new areas of research. Sometimes the original questions that inspired the work are revised with 20-20 hindsight and appear reformulated in publications after the research observations are collected and evaluated.

*Out of class:*

The students should write several open questions and explain the rationale for them. **These should be submitted as Assignment 5 to Canvas before Oct 14 10:20 AM.**

### **Week 7, Oct 14: Introduction: Organizing Specific Aims, What You Want to Accomplish**

*In class:*

The Instructor will describe how to indicate the goals of the proposed research, and how the goals will be accomplished. The goals are intentions to accomplish benchmarks. The goals are usually organized as a list of one to four Specific Aims. They are described as questions to be answered or hypotheses to be tested, not just tasks. Under each question or each hypothesis, the investigator indicates the rationale or motivation, what information is to be obtained, and how that information will be obtained, both the logic and the methods.

*Out of class*

The students should list several Specific Aims as questions to be answered or hypotheses to be tested, and for each include the rationale or motivation, what information is to be obtained, and the logic and methods for obtaining that information. **This should be submitted as Assignment 6 to Canvas before Oct 21, 10:20 AM.**

**Week 8, Oct 21: Introduction: Developing an Argument: The Work is Significant, Innovative, and Feasible**

*In class:*

The Instructor will describe how to conclude the Introduction with an argument that the proposal is significant, innovative, and feasible. The significance should be both to the specific field of research and to a broader context of public health. It should address the possible challenge of “Clever research but so what?” The importance of specifying the innovation is that there may be many competing similar proposals, so it is necessary to indicate how yours is different than what others have done or can do, and that the difference will allow you to accomplish something that others cannot accomplish. You need to provide an argument that your methods and logic are possible, and not magic bullets.

*Out of class:*

The students should write an argument that the proposed work is significant, innovative, and feasible. **This should be submitted as Assignment 7 to Canvas before Oct 28, 10:20 AM.**

**Week 9, Oct 28: Identifying Materials and Methods, How you will accomplish your Specific Aims**

*In class:*

The Instructor will describe the format of an informative Materials and Methods section, and provide effective examples. The purpose of this section is to provide the reader with enough information so that the reader understands what was done, and justification for decisions that were made. For methods common to the field of research, reference may be made to previously published protocols. More detailed description may be made of unique methods. Improvements in conventional methods may be indicated. Development of entirely new methods that can accomplish something new may be described with examples of novel results. The Instructor will indicate the distinction of the Materials and Methods section and lab protocols. Analytical methods, statistical methods, and computer applications or routines, should be described.

*Out of class:*

Students should write a Materials and Methods section appropriate to their proposed research. An Appendix should include a glossary of terms. Additional material such as computer code or detailed lab protocols may be included in the Appendix as appropriate. **These should be submitted as Assignment 8 to Canvas before Nov 4, 10:20 AM.**

**Week 10, Nov 4: Presenting Data with Figures, Legends, and Tables**

*In class:*

The Instructor will discuss tips and strategies for preparing Figures with their Legends, and Tables. Instructor will also discuss how to incorporate simple statistical analysis into written text, figures, and tables.

*Out of class:*

Students should review the PowerPoint slides from today's class (Analyzing and Presenting Data). Students should read "Making Figures Using Powerpoint," "Scientific Presentations," and "What's in a Picture" on the Canvas site.

Students should prepare at least two Figures with their Legends, and two Tables, using your own data, or devise mock data to use as examples to demonstrate you understand what constitutes a good presentation. Each Figure with its legend, and each Table with its footnotes should be on a separate page. **These should be submitted as Assignment 9 to Canvas before Nov 11, 10:20AM.**

### **Week 11, Nov 11: Learning to be an Effective Interviewee**

#### *In class:*

This is a course in Thesis Writing AND Communication. Oral communication, as well as written communication are important. If you cannot effectively express your knowledge orally, then your knowledge will appear to others as meager and unsatisfactory. As practice in orally expressing the knowledge of your research project, there will be mock interviews. The Instructor will introduce suggestions for students to prepare for interviews such as might be part of an application for medical school, graduate school, or for a job in academia, industry, or government.

Such interviews provide the applicant's organization the opportunity to learn more and different information than is included in the applicant's written essay and academic transcript. Such interviews are typically on a one-on-one basis, flexible format, and subjective.

The Instructor will suggest how to prepare for the interview, how to provide information about one's self, some questions to expect, and how to respond to challenging questions.

#### *Out of class:*

Students should prepare for a 15-minute interview conducted by the Instructor by reviewing the PowerPoint slides "Preparing for an Interview" on the Canvas site, and filling out the one page "Interviewee Form". The Form will be available to the Instructor before the interview as an introduction to the student. The student's research project, and the published literature that are the basis for the project, will be a substantial part of the interview. **Students should fill out the Interviewee Form and submit it as Assignment 10 to Canvas before Nov 18, 10:20 AM.**

### **Week 12, Nov 18: Scheduled Interviews**

#### *In class:*

The schedule of a 15 minute remote interview with each student will be posted as an Announcement in Canvas.

#### *Out of class:*

Students should assemble all sections of their Thesis Draft that they previously wrote, review and revise. In addition, students should write and include a Title Page, and Table of Contents. There should be a minimum of 10 text pages of Introduction (excluding Figures and Tables), and a Bibliography with a minimum of 25 formatted citations. The journal used as a guide for the formatting of the citations should be indicated. The assembled Thesis Draft should include all of the following: Title Page, Table of Contents, Abstract, Introduction, Materials and Methods, Bibliography, and Appendix. MS-Word, 8.5x11 inches, 11-point Arial, double spaced, 0.5 margins top, bottom, and sides. The file "Thesis Guidelines" on Canvas and the Department website has an example format for the Title Page and Table of Contents.

**The revised and assembled Thesis Draft should be submitted to Canvas as Assignment 11 before Nov 25, 10:20 AM.**

### **Week XX, Nov 25: No Class. Friday Classes on Wednesday**

**Week 13, Dec 2: Scheduled Interviews**

The schedule of a 15-minute remote interview with each student will be posted as an Announcement in Canvas.

**Week 14, Dec 9: Reviewing the Take Home Lessons (Last Class)**

The Instructor's comments on the revised Thesis Draft will be available on Canvas by Dec 9, 10:20 AM. Students should use these comments to revise this Draft.

**Final Exam Week**

Students should submit a final Thesis Draft to Canvas as Assignment 12 before Friday Dec 18, 4:00 PM. This is during Exam Week.

**Schedule of Classes and Assignments**

Week	Date	Class topic	Assignment	Percent of Grade
1	Sept 2	Intro Course Parts of Thesis Draft	None	
2	Sept 9	Searching Literature	None	
3	Sept 16	Managing Citations Constructing Bibliography	1. Essay: Faculty Research Articles	5%
4	Sept 23	Creating Outline Writing Preliminary Abstract	2. Formatted Preliminary Bibliography	5%
5	Sept 30	Intro: Reviewing Published Literature, Writing Critical Review	3. Outline and Preliminary Abstract	10%
6	Oct 7	Intro: Identifying Open Questions	4. Intro: Critical Review Formatted Full Bibliography	10%
7	Oct 14	Intro: Organizing Specific Aims, What you want to accomplish	5. Intro: Open Questions	10%
8	Oct 21	Intro: Developing an Argument, Significant, Innovative, Feasible	6. Intro: Specific Aims	10%
9	Oct 28	Identifying Materials & Methods How to accomplish Specific Aims	7. Intro: Argument Significant, Innovative, Feasible	10%
10	Nov 4	Presenting Data with Figures Legends, Tables	8. Materials & Methods, Appendix	5%
11	Nov 11	Learning to be an effective interviewee	9. Presenting Data	5%
12	Nov 18	Scheduled Interviews	10. Interviewee Form	5%
--	Nov 25	No class, Friday classes	11. Thesis Draft Revise Sections, Assemble	10%
13	Dec 2	Scheduled Interviews	None	
14	Dec 9	Reviewing Take Home Lessons	None (Thesis Draft will be returned)	
Final Exam Week	FriDec18, 4:00 PM		12. Thesis Draft Final Revision	15%