

## BC 499B Literature-based Thesis

Fall Session, 2017 — Dr. Robert Cohen, Course Director

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**CSU Student Honor Code:** This course will adhere to the Academic Integrity Policy of the Colorado State University [General Catalog](#) {Page 7} and the [Student Conduct Code](#).

### Part One: Guidelines

#### 1. BC 499B,C,D (3 credits)

You may only register for Senior Thesis, BC499B, C, or D, (3 credit one semester course), in your senior year. The course is similar to an independent study in that you are working directly with your instructor to create the learning experience. For an idea of the hours involved, three credits are equivalent to approximately 135 hours of work per semester, which breaks down to nine hours of work per week, or 12 hours per week until the due date of the final draft of the thesis. These figures should be approximately doubled for Summer Session. This is the same amount of time any 300- or 400-level class typically requires. As you can see, it will take a serious commitment of time and effort to complete your thesis! BC 499B is graded on a traditional grading scale (A, B, etc.). Your BC 499B instructor decides your final grade based on the quality of your work and oral presentation.

#### 2. Definition of the Thesis

The BC 499 thesis is designed to provide a culminating experience that allows students to explore areas of Biochemistry & Molecular Biology about which they are most passionate, engage in the process of discovery, and make a creative contribution in their areas of interest and expertise. The Thesis is to be an **original** work by the author based upon a combination of review and original literature articles from the recent scientific publications. **Plagiarism at any stage will automatically result in a failing grade for the course.** Limited quotations may be incorporated into the thesis, where appropriate, with proper quotation marks and references, but **the majority of the thesis is to be written by you. The thesis should be topical. At least two of the primary literature references used in your thesis must have been published in 2016 or 2017.**

A BMB faculty member supervises the senior thesis experience. The faculty instructor assists the student in the thesis writing process. The thesis has writing, reviewing, editing and presentation components. The written thesis will be 4000 words minimum (text only excluding figures, figure legends, and references), 6000 words maximum, double-spaced (1" margins, 12 point type, Times or similar serif font). The BC499 thesis style will be based on that of a "Trends in X" article (also see section 4 for specifications). The presentation component consists of an oral presentation by the student and responses by the student to questions from the instructors and fellow students. The oral presentation is open to the public.

#### 3. Deadlines

To ensure adequate progress of writing a thesis, BC499 has several mandatory due dates to turn in written forms and thesis drafts. The grades associated with each assignment and the deadline dates are listed in Section 6 of this document. **Failure to meet any deadline will result in an automatic zero points for that assignment, and if you miss the peer review deadline you will get an automatic F in the course, meaning you will have to retake it in order to graduate.**

All the written materials should be received in the Department office or by the instructor via email by 4:00 PM on the specified due date unless otherwise indicated.

## Thesis Writing Timetable

### Preliminary Proposal (due 9/11)

You should have identified a topic in BC493 last year. The preliminary proposal is intended to help focus your ideas and generate a thesis topic. Use the *BC 499B Thesis Preliminary Proposal*, included in this packet, to briefly describe your topic and then submit it to the departmental office by the due date. On this form you will also indicate your preferred instructors to mentor the development of your Senior Thesis – we will try to match students with appropriate instructors based on the thesis topic, student preference, and instructor availability. **If you need help identifying a topic and selecting potential advisors, please email Dr. Cohen (bob.cohen@colostate.edu).**

### Formal Proposal (due 9/25)

The BC 499B Thesis Formal Proposal is a comprehensive statement about your thesis topic and plans. Your instructor must approve your proposal. If you wish to change your topic after submitting the formal proposal, your instructor must approve the new proposal. The *BC 499B Thesis Formal Proposal* form is part of this guide document and is to be submitted to Stasi Brazil-Engleman in the department office.

### Preliminary draft Thesis for Instructor Review (due 10/16)

The preliminary draft version of the BC 499 Thesis is your first real written draft. You should have determined the organization of your entire thesis and this draft should contain **at least the first two pages of the Introduction close to its final form (this will be graded)** and all the sections in some preliminary form, with references being optional at this stage. **The draft of the thesis must be submitted to the Biochemistry office.**

### Draft Thesis for peer review (due 10/30)

This draft should be close to the final version of your thesis, **including all references**, and is due **in electronic format (Word file)** to your primary instructor. The instructor will distribute copies of draft manuscripts to each student in the course for peer review. The peer reviewers will have ~10 days to read the proposals and make specific recommendations to the authors, as per the Peer Review Guidelines page of this Guide. A significant portion of the course grade will be based on the quality and thoroughness of the peer reviews. We expect you to make constructive comments.

### Peer Reviews of Theses (due 11/10)

The completed peer reviews, consisting of two documents for each thesis ((1) a marked-up version of the thesis; (2) answers to the Peer Review questions) **will be submitted electronically to your instructor**. The instructor will grade your reviews and return the manuscript with the reviews to the authors for their consideration. Authors may choose to revise the manuscript in accordance with some or all of the reviewers' comments, or otherwise alter the manuscript appropriately to improve the final version of the thesis.

### Final Printed Thesis (due 11/27)

Students submit the final printed version of their thesis to the Biochemistry Office. The student should have responded appropriately to the peer reviewers in this version of the thesis. We expect the thesis to be in excellent form by this stage of the process, clearly written and informative with no spelling or grammatical errors, and figures integrated into the text. *The quality of the thesis itself comprises approximately half of your overall grade.*

### Thesis Presentation (day and time tbd: 12/4 – 12/8)

The presentation is an opportunity to present your thesis to your peers and instructors. You must give an oral presentation about your thesis to the instructor and class during the last week of classes. The BC 499B thesis presentation differs from a graduate thesis defense in that it is less formal and more of an opportunity to share your learning experience with your peers.

The senior thesis oral presentation is open to the public and will be publicized to students, faculty, and staff of the Department of Biochemistry and Molecular Biology by posting on the department's website and printed announcements. Faculty, staff, students, family members, and other interested individuals are welcome to attend and to ask questions at the thesis presentation.

#### 4. Specifications for the final copy of the senior thesis

1. The written thesis must consistently follow a writing style appropriate for the type of research in the thesis. The style and standards are determined by your instructor, but will generally follow that of a "Trends in X" (there are many to choose from) article.
2. The thesis must be 4000 words minimum, 6000 words maximum, double-spaced (6 lines per inch), single column, 1" margins all around, 12 pt type, Times or similar font. The pages should be numbered.
3. The cover page of your final thesis should contain the title of your thesis, your name, the date, followed by "**Submitted to the Department of Biochemistry and Molecular Biology, Colorado State University, in partial fulfillment of the requirements for a B.S. Degree (BC 499[B, C, or D, as appropriate]), Fall 2017**"
4. The thesis should be based on *at least ten primary* research papers from the scientific literature, in addition to relevant review articles. *At least two of the primary papers must have been published recently (i.e., in 2016 or 2017).*
5. Primary references are to be to scientific journal publications, not to web sites. Cite your references following the format of the journal "Cell" (described at the following url: <http://www.cell.com/authors#sections> ).
6. Plagiarism in any form will be monitored closely and not tolerated. Students guilty of plagiarism will receive a failing grade in the class, and appropriate disciplinary action will be taken.

#### 5. Grading

**This course uses conventional grades (i.e. A, B, C, D, and F).** A total of 100 pts are divided as outlined in the deadline summary shown below. Failure to turn in an item on time will result in a grade of zero for that item. Turning in shoddy or incomplete work will result in a partial grade.

**IMPORTANT NOTE: a course grade of F will be issued if you fail to turn in your thesis for peer review on time because it is imperative that all students participate at this stage.**

#### 6. Deadlines and Grading Summary

*Items due by 4 PM unless otherwise stated*

September 11, 2017	Preliminary proposal form due in the BMB Departmental Office (5 pts)
September 25, 2017	Formal proposal form <b>with instructor approval</b> due in BMB Office (5 pts)
October 16, 2017	Preliminary draft of thesis due in printed form to BMB Office (5 pts)
October 30, 2017	Complete thesis draft for peer review <b>by e-mail to your instructor</b> (15 pts)
October 31, 2017	Theses available for peer review ( <b>emailed by BMB Office staff</b> )
November 10, 2017	Peer reviews of two other theses due <b>by e-mail to your instructor</b> (15 pts) This includes addressing the review criteria provided <b>and</b> making electronic comments on the theses themselves.
November 27, 2017	Final thesis due in printed form to the BC Office (40 pts) 10 pts for organization 10 pts for depth of coverage 10 pts for clarity of writing 10 pts overall quality

## **Part Two: Thesis Methods and Writing**

### **Selecting a topic**

Completing a thesis is a rigorous and time-consuming endeavor, so you should select a topic that is both intellectually exciting and challenging. If you had previously taken BC493 (Senior seminar), you can use that same topic for your thesis. Otherwise, the following are some helpful hints about finding and choosing a topic:

- > As soon as possible start a “topics file” in which you keep track of potential areas of interest. Occasionally review your file to see if there are recurrent themes to your interests.
- > Ask yourself the following questions: What Biochemistry and Molecular Biology topics have most engaged me? What am I most curious about? What do I enjoy? What am I most passionate about?
- > Visit with faculty and discuss ideas with them. They have a great deal of experience and knowledge that will help you discover a topic.

We encourage you to visit the Biochemistry office and read through past theses to get a better feel for the full range of topics and proper formatting. See Stasi Brazil-Engleman to access the theses.

### **Thesis Methods and Approaches**

Research and scholarship methods and approaches vary. Therefore, it is important to meet with your primary thesis instructor to discuss accepted guidelines for your thesis area. An excellent resource for research by discipline can be found on the Writing Center webpage <http://writing.colostate.edu/>. This site discusses many aspects of writing such as research techniques, using print and electronic sources, and citing sources. Your faculty advisor can provide additional insight into other electronic database resources for primary literature, including the PubMed and the Web of Science (see below).

### **Writing Styles**

Specific writing styles vary by discipline, so you should consult with your BC 499B instructor for guidance about the writing style appropriate for your topic. In general, the thesis style should be based on that of a “Trends in” article. For each style, there are manuals to help you understand and stay within the boundaries of your discipline. In addition, the Writing Center has writing guides online.

The written component of the thesis experience must incorporate the fundamentals of writing that you have learned in your composition courses. You need to pay particular attention to:

- > organizing your writing for your audience;
- > engaging in writing as a process which includes formal and informal writing, and writing multiple drafts that are reviewed and subsequently revised;
- > utilizing the writing expertise you have learned while writing summaries, syntheses, evaluations, and arguments in your Freshman Seminar and composition courses;
- > cohesion of ideas and document formatting
- > editing and proofreading
- > utilizing appropriate citation styles – it is worth the effort to learn to use a citation program such as EndNote early on in your writing.

Finally, a thesaurus and dictionary are essential tools to good writing, but do not rely solely on your computer for spell checking — although it is valuable, it is not foolproof.

## Peer Review Criteria

Remember to both *describe* and *advise* in your responses to all the questions below. Simple “yes/no” responses are not helpful and will not be acceptable.

Reviewers are to edit each thesis for grammar and spelling using the “Track Changes” tool under the Word “Toolbox” menu. In addition, reviews are to address each of the following questions:

### Overall Responses:

1. What is your overall response – i.e., your gut reaction – to the thesis? Why?
2. Generally, what did you like best about the thesis? Why?
3. Generally, what did you like least about the thesis? Why?

### Focus:

1. Is the thesis clearly written? Why or why not?
2. Does the thesis offer new insight and address a complex and compelling issue(s)? Why or why not?

### Development for Audience:

1. Who is the audience for this thesis? Try to put yourself into the position of the intended audience of this piece. Is this a topic that you are interested in?
2. Identify one section of the thesis that is well developed with solid evidence and examples. Why is this a well-developed section?
3. Identify at least one section of the thesis that would benefit from further development and support. Offer concrete suggestions for the author to develop that section.

### Organization:

1. Are paragraphs well-developed and clearly linked to the author’s focus?
2. Comment on at least two transitions. Does the author provide clear transitions between paragraphs? Does the thesis “flow” from idea to idea? Why or why not?

### Style:

1. In a word, how would you describe the tone or voice of the thesis?
2. Is the tone appropriate for the audience? Why or why not?
3. Comment on the author’s sentence structure. Is it varied and engaging? Choose one paragraph as an example for your analysis.

### Conventions:

1. Does the author have any patterns of sentence-level errors that detract from your reading? If so, comment on them.
2. Are the references appropriate in style and substance?

## Suggest References & Sources of Topic Ideas

Search resources:

PubMed (Search by author, subject, year, journal):

<http://www.ncbi.nlm.nih.gov/sites/entrez?db=PubMed>

Web of Science (to search for more recent papers that reference one you already have):

1. Go to CSU "Library" link: <http://lib.colostate.edu/>
2. Go to the "Articles & Databases" tab
3. Select "Web of Science – scholarly articles"
4. Or follow this url:

[http://apps.isiknowledge.com/WOS\\_GeneralSearch\\_input.do?product=WOS&search\\_mode=GeneralSearch&SID=1BOchf9dMDLh3NdOeJC&preferencesSaved=&highlighted\\_tab=WOS](http://apps.isiknowledge.com/WOS_GeneralSearch_input.do?product=WOS&search_mode=GeneralSearch&SID=1BOchf9dMDLh3NdOeJC&preferencesSaved=&highlighted_tab=WOS)

Examples of Primary Literature (peer reviewed)

General areas in science:

*Science*

*Nature*

*Proceedings of the National Academy of Sciences, USA*

Biochemistry & Molecular Biology

*Cell*

*Nature Structure & Molecular Biology*

*Nature Medicine*

*Nature ...*(other sister journals)

*Biochemistry*

*Molecular and Cellular Biology*

*Journal of Biological Chemistry*

*Journal of Molecular Biology*

*Nucleic Acids Research*

*Proteins*

*Protein Science*

Review Journals

*Trends in Biology*

*Trends in Biochemical Sciences*

*Trends in Cell Biology*

*Trends in ...*(see library for full listing)

*Current Opinion in Cell Biology*

*Current Opinion in Structural Biology*

*Current Opinion in ...*(see library for full listing)

*Journal of Biological Chemistry Minireviews*

*Annual Review of Biochemistry*

*Annual Review of Biophysics and Structural Biology*

*Annual Review of Genetics*

*Annual Review of Cell and Developmental Biology*

*Annual Review of ...*(see library for full listing)

## **Titles of Some Recent Theses**

Fragile X Associated Tremor/Ataxia Syndrome

Vitamin D, sunlight and cancer

RNA Polymerase Pausing

Mechanisms and Mutations of HER2 and its Subsequent Role in Cancer Growth

Genetically Engineered Lymphocytes as a Possible Treatment of Cancer

Improvements in Acetylcholinesterase Inhibitors in the Treatment of Alzheimer's Disease

The Role of p53 and Associated Proteins in Lung Cancer

Regulation of the KiSS-1 Gene in the Metastasis of Breast Cancer

HIV Induced Neuropathogenesis

Viability of Viruses as Vectors for Cancer Therapy

The Significance of the BCR-ABL Tyrosine Kinase on Chronic Myeloid Leukemia

RNA Polymerase Inhibitors: Antibacterial Drug Targets

DNA as molecular computers

**Form 1  
BC 499B THESIS  
PRELIMINARY PROPOSAL**

Please complete the preliminary proposal form with your primary BC 499B instructor, and submit to the Biochemistry office by **4:00 PM on the due date**. The instructor will review the form and place it in your records. **Please type.**

Name: \_\_\_\_\_ eID: \_\_\_\_\_

Phone: \_\_\_\_\_ E-mail: \_\_\_\_\_

Major(s) and Minor(s): \_\_\_\_\_

Semester and year you intend to graduate: \_\_\_\_\_

Preference for thesis instructor (see list of available instructors on Page 1 of guide lines):

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

Tentative thesis title: \_\_\_\_\_

Thesis description: Describe the questions you plan to address in your thesis. Explain why you are interested in this topic.

\_\_\_\_\_  
Student signature

\_\_\_\_\_  
Date



**Form 2  
BC 499B THESIS  
FORMAL PROPOSAL**

Please complete the formal proposal form and submit the approved form to the Biochemistry Office. The Formal Proposal is due by **4:00 PM on the due date**. Approval by your primary BC 499B instructor is required. **Please type.**

Name: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Email: \_\_\_\_\_

Primary Instructor: \_\_\_\_\_

Thesis Title: \_\_\_\_\_

Please attach a description of your thesis that provides the following:

- > An abstract (200-250 words)
- > An outline of your thesis
- > A list of references you have used to date.

\_\_\_\_\_  
Student signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Primary Instructor signature

\_\_\_\_\_  
Date

## ***Instructors' Forms***

BC499B, C, D Evaluation of Progress

Student Name: \_\_\_\_\_

Task (Due date)	On Time (Y/N)	Comments	Grade
Prelim Proposal (9/11)			/5
Formal Proposal (9/25)			/5
Prelim Draft (10/16)			/5
Complete Thesis (10/30)			/15
Peer reviews (11/10)			/15
Final Thesis (11/27)			/40
Presentation (12/4 – 12/8)			/15

## BC 499B THESIS AFFIRMATION AND EVALUATION FORM

The BC 499B, C, D senior thesis is comprised of both a written document delving into the scientific literature surrounding an area of current active research and an oral presentation that serves as the last of three formal oral presentations in Biochemistry and Molecular Biology curriculum.

### SECTION I Affirmation Statement

\_\_\_\_\_ completed the presentation of their senior thesis on \_\_\_\_\_.  
(Student's name) (Date)

Primary Instructor: \_\_\_\_\_  
(Name)

### SECTION II Deadlines and Peer review (35 pts)

Preliminary draft (5 pts) \_\_\_\_ Draft for review (15 pts): \_\_\_\_ Peer review score (15 pts) \_\_\_\_\_

### SECTION II Written Thesis (40 pts) \_\_\_\_\_

a. Organization (10 pts)

b. Depth & References (10 pts)

c. Writing (10 pts)

d. Overall quality (10 pts)

Comments:

**SECTION III Oral Presentation and Speech Communication (15 pts) \_\_\_\_\_**

Please assess the student's speech communication skills according to the criteria listed below.

<b>Key:</b> ++ Excellent + Satisfactory - Needs Improvement 0 Failed to Complete
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*Introduction*

- \_\_\_ Captured audience attention/interest
- \_\_\_ Previewed main points

*Body*

- \_\_\_ Main points clear
- \_\_\_ Main points supported
- \_\_\_ Organization logical
- \_\_\_ Sources cited
- \_\_\_ Clarity of visual aides
- \_\_\_ Management of visual aides

*Conclusion*

- \_\_\_ Summarized main points
- \_\_\_ Addressed audience questions

*Delivery*

- \_\_\_ Volume
- \_\_\_ Rate
- \_\_\_ Articulation
- \_\_\_ Eye Contact
- \_\_\_ Enthusiasm

*Overall Impression & Comments on Oral Presentation.*

**SECTION IV**

Confirms that both as written and electronic copy of the final thesis has been approved by the primary instructor and received by the Biochemistry Office.

Primary instructor signature: \_\_\_\_\_