

Program Guide

for the

**MASTER OF SCIENCE
IN BIOLOGY**

**Field/Laboratory and Literature Review
Thesis Options**

Including instructions for admission to the
Program, Advisory Committee formation, and
guidelines for writing the Thesis



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INTRODUCTION

We are pleased that you have expressed an interest in the Master of Science Program in Biology at the University of Central Oklahoma (UCO). Information concerning our program is provided in this booklet.

The mission of the Department of Biology M.S. Program is to provide students with content knowledge and training beyond that provided by the B.S. in Biology degree; prepare students for further graduate studies and/or for specific career opportunities in education, research, medicine, allied health, and/or other professional areas; and prepare students to be leaders in the sciences by developing the skills and abilities necessary to function as productive, creative, ethical and engaged scientists as determined by community, state, national and international needs. This is achieved through selected coursework, research design and experimentation, faculty mentoring, and interactions with peer communities.

We serve a broad spectrum of students with diverse backgrounds from metropolitan and rural regions of the state, country, and world. The educational depth is determined by specific courses selected for the student's personalized Plan of Study and their thesis work. Students can choose one of two degree options, either the Field/Laboratory Thesis option or the Literature Review Thesis option.

The Biology Department annually awards Teaching Assistantships on a competitive basis. Research Assistantships occasionally are available through individual faculty members. You should contact your faculty mentor to inquire if this is an option. Assistantships provide financial support, through a tuition waiver and a stipend, in return for completing assigned duties.

Prior to being accepted into our program, a graduate faculty member must agree to serve as your Major Advisor. Our faculty conducts research in a variety of disciplines in biology (see the list of faculty research interests below). Please visit with our faculty prior to completing your application. Visit the departmental website, www.biology.uco.edu, for more information and links to faculty websites. To obtain more information or ask questions, you also may contact either the Interim Department Chairperson (Dr. Robert Brennan, 405-974-5735, rbrennan1@uco.edu) or the Biology Graduate Program Advisor (Dr. Michelle Haynie, 405-974-5774, mhaynie@uco.edu), or write to the Department of Biology, University of Central Oklahoma, 100 North University Drive, Box 89, Edmond, Oklahoma 73034-5209 (405-974-5017). General information regarding UCO graduate programs and requirements can be obtained through the Jackson College of Graduate Studies (hereafter referred to as Graduate College; <http://www.uco.edu/graduate/>).

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M.S. IN BIOLOGY DEGREE OPTIONS

All students must choose one of two degree paths: the Field/Laboratory Thesis Option or the Literature Review Thesis Option.

Field/Laboratory Thesis Option

The Field/Laboratory Thesis Option provides graduate students with experience in the design, execution, and reporting of scientific research based upon the collection of original data. This option is pursued by students who have a strong interest in research and intend to use these skills in their career. Graduate students who plan to enter research professions and/or pursue a doctorate degree should enroll in the Field/Laboratory Thesis Option. Students must complete 32 hours of coursework, all of which must be at the 5000 level. The coursework must include 6 hours of Thesis and 26 hours of Guided Electives. Guided Electives are selected in consultation with the thesis Advisory Committee. This option requires: a written thesis based upon original data collected in the laboratory or field, an oral defense open to the public, and an oral exam administered by the Advisory Committee.

Literature Review Thesis Option

A Literature Review Thesis is an exhaustive examination of peer-reviewed literature on a specific biological topic. This option does not require the generation of original data, but rather an original synthesis of already published material. The Literature Review Thesis option provides graduate students with additional graduate coursework compared to the Field/laboratory Thesis option. Additionally, this option typically is considered a terminal degree. Graduate students who want to reinforce their knowledge of biology for a career as an educator at the secondary or junior college level may want to take advantage of this option. Students must complete 32 hours of coursework, all of which must be at the 5000 level. The coursework must include 2 hours of Thesis and 30 hours of Guided Electives. Guided Electives are selected in consultation with the thesis Advisory Committee. This option requires: a written thesis based upon a thorough review of the literature to address a specific question, an oral defense open to the public, and an oral exam administered by the Advisory Committee.

Both the Field/Laboratory and Literature Review Thesis options require a written thesis. For the remainder of this program guide, this written work whether Field/Laboratory or Literature Review, is referred to simply as the “thesis” unless otherwise stated.

PROGRAM ADMISSION AND REQUIREMENTS FOR THE M.S. IN BIOLOGY

The guidelines listed on the following pages are excerpted from the Graduate Catalog.

University of Central Oklahoma

Program: Biology

Major: Biology

Major Code: 6600

Degree: Master of Science (M.S.)

Department: Biology

College: Mathematics and Science

Graduate Advisor: Dr. Michelle L. Haynie

E-Mail Address: mhaynie@uco.edu

Office Address: HOH 200B

Phone Number: 405-974-5774

Admission Requirements

- BS/BA in Biology or related field

Submit the following items to:

Jackson College of Graduate Studies (JCGS)

100 N. University Dr., Nigh University Center 404

Edmond, OK 73034.

- Written statement of a graduate faculty member's commitment to serve as Major Advisor.
- Online application for admission (<http://www.uco.edu/graduate/admissions/index.asp>).
- Official copies of undergraduate and graduate transcripts from each institution attended with all degrees posted. All transcripts must be from accredited institutions. Undergraduate transcripts must show a minimal 2.50 GPA overall with a preferred minimal 3.00 GPA in the last 60 hours attempted.
- GRE scores with a preferred minimum 50th percentile ranking in both the quantitative and verbal sections.
- Three letters of recommendation, one of which may be from the faculty member who will serve as Major Advisor.
- Students with a native language other than English must submit evidence of English language proficiency. See Admission to Graduate Studies– English Language Proficiency.

Note: Students must meet with faculty mentor/advisor in a group or individual advisement session before enrolling.

Other Requirements

- Thesis Advisory Committee. Form a thesis Advisory Committee and meet with it at least once per academic year.
- Plan of Study. Each student must file a Plan of Study with his/her Biology Graduate Program Advisor and the Jackson College of Graduate Studies by the end of the first semester of graduate work. The Plan of Study must be signed and dated by the student and the Biology Graduate Program Advisor before it can be considered official.

- Academic Standards. Meet the following course work standards:
 - Overall GPA of 3.00 or higher.
 - No more than 6 hours of “C”.
 - No more than six advisor-approved hours from traditional correspondence courses.
- Thesis. Complete a thesis, present it to the public, and defend it successfully before the Advisory Committee. The defense will include an oral comprehensive examination administered by the Advisory Committee. Submit two paper copies of the thesis and one electronic copy to the library through Proquest and the thesis’ Title Page, original Signature Page, Thesis Summary Document, and Abstract Page to the JCGS.
- Final Requirements. Apply for graduation through the JCGS by advertised deadline.

Graduation Requirements

Field/Lab Thesis Option

Required Courses:6 Hours

BIO 5990 Thesis hours (6 total and spread among semesters)

Guided Electives (5000 level courses only)26 Hours

Courses chosen in consultation with Thesis Advisory Committee.
Original research is a part of the Field/Lab Thesis Option.

TOTAL HOURS REQUIRED32 HOURS

Literature Thesis Option

Required Courses:2 Hours

BIO 5990 Thesis hours (2 total and spread among semesters)

Guided Electives (5000 level courses only)30 Hours

Courses chosen in consultation with Thesis Advisory Committee

TOTAL HOURS REQUIRED32 HOURS

NOTE: Each student must complete 32 hours of 5000 level coursework, which includes thesis hours. A Plan of Study should be designed based on the student’s academic record and recommendations of the Advisory Committee. The Advisory Committee may require completion of lower-level course deficiencies or prerequisites.

(End of Graduate Catalog summary)

AFTER ADMISSION TO THE M.S. IN BIOLOGY DEGREE PROGRAM

Semester Schedule:

The following schedule is suggested to promote completion of the M.S. in Biology Degree in two years. This schedule is for full time Master's students; students who either enroll part-time or discontinuously will undoubtedly take longer to complete the degree. For regulations regarding discontinuous enrollment, see the Graduate Catalog provided by the Graduate College. See Appendix I for a summary checklist of important deadlines. See Appendix II for the forms discussed below.

First Semester

1. Establish a research project or literature review topic with the Major Advisor.
2. Form the Advisory Committee
3. Meet with your Advisory Committee, develop a Plan of Study, and complete Forms I, II, and IV
 - File Form I – *Advisory Committee Approval Form* with the Graduate College and Biology Graduate Program Advisor.
 - File Form II – *Formal Plan of Study* with the Graduate College and Biology Graduate Program Advisor.
 - File Form IV – *Notification of Advisory Committee Meeting* with Biology Graduate Program Advisor.
4. Begin writing/revising the thesis proposal. If possible, submit a draft of the proposal to the Advisory Committee by the end of this semester.
5. Begin thesis project.

Second Semester

1. If not done during the first semester, Forms I, II, and IV must be completed and submitted to remain in good standing.
2. Finish your thesis proposal. Upon approval of the research proposal by the Advisory Committee, complete Form III.
 - File Form III – *Thesis Proposal Approval* with the Graduate College and Biology Graduate Program Advisor.
3. File a progress report (Form IV) with Biology Graduate Program Advisor if a report was not filed during the first semester.
4. Continue thesis project.

Third Semester

1. If not done during the second semester, the thesis proposal and Form III must be approved and submitted to remain in good standing.
2. Meet with the Advisory Committee to discuss research progress and file a progress report (Form IV) with the Biology Graduate Program Advisor.
3. Continue thesis project and begin drafting the thesis. Submit thesis drafts to your Major Advisor

Fourth Semester and Additional Semesters as Necessary

1. File a progress report (Form IV) with Biology Graduate Program Advisor if a report was not filed during the third semester.
2. Finish thesis drafts. Early in the fourth semester you should submit thesis drafts to your Advisory Committee (only with approval from your Major Advisor). Allow at least two weeks for the Advisory Committee to read and comment on the thesis.
3. Make revisions and confer with members of the Advisory Committee.
4. Schedule defense with the Graduate College two weeks prior to the defense date and submit a thesis summary.
 - File Form VI – *Thesis Defense Scheduling Form* with the Graduate College and the Biology Graduate Program Advisor.
5. Advertise public presentation at least one week prior to the presentation.
6. Hold public presentation, oral defense, and comprehensive oral examination.
7. Apply for graduation through the Graduate College by the advertised deadline.

Enrollment:

Students must be cautioned that courses completed as a graduate student before formation of the Advisory Committee will be accepted as part of the Plan of Study at the discretion of the student's Advisory Committee. Students should meet with the Major Advisor prior to enrolling in the first semester and with the Advisory Committee to develop a Plan of Study prior to enrolling in the second semester.

To be considered a full time student for Financial Aid, students must be enrolled in 9 hours in the fall and spring semesters, and 5 hours in the summer semester. To be eligible for Teaching Assistantships (TAs) and Research Assistantships (RAs), students must be enrolled in at least 5 hours in the fall and spring semesters, and 3 hours in the summer semester.

See Appendix III for a list of courses offered in the department. The semester each course is offered is included in the appendix. This spreadsheet should be used when developing a Plan of Study.

Enrollment in Thesis Hours (*the following is taken directly from the Graduate Catalog*)

The maximum number of thesis hours which may be applied toward any graduate program is six. Once enrolled in thesis hours, a student must remain continuously enrolled in thesis hours during each fall and spring semester until full completion of all thesis requirements have been met. Thesis hours completed during the development and preparation of a thesis but prior to its final completion will be assigned an "X" grade and will contribute to the "Hours Attempted" and "Hours Earned" sections of the student's transcript. The "X" grade will not, however, contribute to the graduate GPA. Once the thesis is completed, the thesis committee chair will assign a Passing or Failing grade ("P" or "F"). While a grade of "P" will not contribute to the graduate GPA, an "F" grade will contribute to the overall graduate GPA and will prevent a student from graduating. Any student who has completed all course work must complete his/her thesis within two academic years (two fall and two spring semesters) beginning with enrollment in the first thesis course. Any exception request to extend beyond two years must be made in writing to the graduate dean.

Irregular Enrollment Courses:

Students may enroll in BIO59x0 courses (this includes seminars and individual study hours) during the course of their degree. Irregular Enrollment forms must be filled out by the course instructor prior to enrollment. The number of hours allowed per semester for each course varies (see Graduate Course Catalog for details). Students may count only 6 hours (in combination) from any of these courses towards their degree (excluding the Thesis hours discussed above).

ADVISORY COMMITTEE

Selection and Role of the Advisory Committee:

Every student in the M.S. in Biology Degree program is required to form an Advisory Committee consisting of a Major Advisor and at least two other graduate faculty members. This should be done preferably during the first semester but no later than the second semester of the program, and under advisement of the Major Advisor. Two committee members (including the Major Advisor) must be from the UCO Department of Biology. A committee member from outside the Department of Biology or the university may serve on the student's Advisory Committee. A fourth individual may be chosen to serve on the Advisory Committee if approved by the other members. Outside committee members should carry credentials from another department, university, government agency, or industry that qualify him or her as a professional in the area of study representative of the Candidate's thesis work. An outside committee member has a vote during the thesis defense and his/her name is included on the Signature Page of the thesis as well as on all other forms signed by the Advisory Committee.

Traditionally, the Advisory Committee operates in a mentoring capacity. The mentor–student relationship is critical to the success of the Candidate and differs substantially from associations between faculty and students in the classroom. The Major Advisor serves as director of the thesis work. The Advisory Committee, as a whole, makes suggestions about and approves the Candidate's graduate program (which includes a list of coursework), thesis proposal, thesis work progress, and the final written presentation of the thesis. The Advisory Committee evaluates the final oral defense and examination.

Because the Major Advisor and Advisory Committee play such an important role in the successful completion of the M.S. in Biology Degree, Candidates are urged to give serious consideration to selection of those faculty who will be working with them for the duration of their degree. It is to the Candidate's advantage to avoid differences that necessitate changes in Advisory Committee membership during their program.

Policies for Changes in the Advisory Committee:

Student Initiated Changes:

Prior to filing the Plan of Study and thesis proposal, no formal action is required should the student wish to make changes in membership of the Advisory Committee. Should the need arise subsequent to filing the Plan of Study and thesis proposal, student-initiated changes require that the Candidate make a written request to the Major Advisor. The request must fully explain the reasoning for the proposed change(s). The Major Advisor will review the request and decide whether or not the change(s) are justified. If changes are made, the Major Advisor must give written notification to the Candidate, the Advisory Committee, the Biology Department Chair, and the Biology Graduate Program Advisor, and submit a revised Plan of Study to the Graduate College and the Biology Graduate Program Advisor.

Should the student desire a change of Major Advisor, the thesis project will not be released to the student without written notification to the Department of Biology Graduate Committee and the Biology Department Chair from the Major Advisor. Should the original Major Advisor release

the thesis project, the new Major Advisor must notify the Biology Graduate Program Advisor in writing that he or she is willing to sponsor the student on the same project. Should the student desire to change the Major Advisor and the original advisor is not willing to release the project, the student may propose a different thesis project and form a new Advisory Committee. With the change in Major Advisor, the student must submit a new Plan of Study to the Graduate College and the Biology Graduate Program Advisor.

In the case that these guidelines are not followed, or at the discretion of the Department of Biology Graduate Committee, the student may be dismissed from the M.S. in Biology Graduate Program.

Faculty Initiated Changes:

Advisory Committee members may find it necessary to withdraw from the committee. Should this situation arise after the Candidate has successfully proposed a thesis project and filed a Plan of Study, the Advisory Committee member(s) will implement the following procedure: give written notification of intention to withdraw to the Candidate, Major Advisor, other Advisory Committee members, Biology Graduate Program Advisor, and the Biology Department Chair. The reasons for withdrawal should be clearly stated. A revised Plan of Study will need to be filed with the Graduate College and the Biology Graduate Program Advisor.

If the Major Advisor wishes to step down, the letter of intent should clearly state the concerns about the Candidate's performance and the specific corrective action(s) required of the Candidate. The Candidate has 5 working days to respond, in writing, to the Advisory Committee, the Biology Department Chair, and the Biology Graduate Program Advisor. Should the Candidate's response be deemed appropriate and provide indication of his/her intent to satisfy the concerns, the Major Advisor will so notify the Candidate, the Advisory Committee, the Biology Department Chair, and the Biology Graduate Program Advisor. If the response is not satisfactory, the Major Advisor may withdraw and the association is terminated. All parties are notified and the decision for termination is forwarded to the Graduate College. Thesis grades that are currently outstanding shall receive the letter grade of "F" or "S" depending upon the decision of the Major Advisor.

The Candidate should understand that withdrawal of the Major Advisor may result in termination of the student's graduate program, including the research, list of courses to be taken, and the Advisory Committee. Unless indicated otherwise by written notification from the Major Advisor to the Department of Biology Graduate Committee, the thesis project is considered property of the Major Advisor. The Candidate will not be allowed to transfer the thesis project to another Major Advisor without written release from the original Major Advisor.

Upon termination of a degree program for any reason, Form VII must be submitted to the Biology Graduate Program Advisor.

Requirements and Format for Advisory Committee Meetings:

Meetings are to be held no later than two weeks before the start of finals week. Meetings should not be held on weekends, school holidays, or during the summer semester unless all members of the Advisory Committee agree. It is the Candidate's responsibility to schedule meetings at a time that is agreeable to all Advisory Committee members. It is the Major Advisor's responsibility to ensure that the Candidate holds these meetings, and that a report of the meeting (Form IV) is filed with the Biology Graduate Program Advisor. Form IV must be sent to the Biology Graduate Program Advisor by the Major Advisor no later than the end of final examination week.

Planning Meeting(s): *(this refers to meetings that occur prior to submitting a Plan of Study and/or a research proposal)*

If so desired by the Candidate and Major Advisor, one or more meetings may be held to form the Advisory Committee, discuss the Candidate's research in a general way, discuss coursework, and discuss other matters of concern. Such meetings are optional if the Candidate is prepared to finalize a Plan of Study or present the thesis proposal at the first committee meeting. Form IV should be completed for at least one planning meeting if the Plan of Study and/or Thesis Proposal meetings do not occur during the first academic year.

Plan of Study Meeting:

The Candidate is required to file a list of coursework to be taken for the M.S. Degree in Biology as approved by the Advisory Committee. A Plan of Study (Form II) must be submitted to the Graduate College and Biology Graduate Program Advisor. Form IV must be completed and submitted to the Biology Graduate Program Advisor. This meeting should take place during the first semester and must take place by the end of the second semester to remain in good standing in the program. The Plan of Study meeting can occur at the same time as the Thesis Proposal meeting if the student is prepared to present his/her thesis proposal.

Thesis Proposal Meeting:

The Candidate is required to prepare a formal proposal of the work to be completed for the M.S. Degree in Biology. The proposal should be presented as soon as possible and must be presented by the end of the third semester to remain in good standing in the program. At least one week prior to the proposal meeting, Candidates are required to give a copy of the thesis proposal to each Advisory Committee member. At the meeting, Candidates are required to make a short (10 to 20 minute) presentation of the proposed work and should be prepared to answer questions. Once the proposal has been accepted by the Advisory Committee, a copy of the proposal along with Form III must be filed with the Biology Graduate Program Advisor. Form IV must be completed and submitted to the Biology Graduate Program Advisor.

Progress Report Meeting(s): *(this refers to meetings that occur after submitting a Plan of Study and/or a proposal)*

At least once per academic year, the Candidate is required to meet with the Advisory Committee and give a report of progress on courses and the thesis project so that problems and/or changes can be discussed. Candidates are required to hold a progress report meeting even if they have completed their course work and are off-campus. Form IV must be completed and submitted to the Biology Graduate Program Advisor.

PROPOSAL GUIDELINES

General Information:

During the beginning stages of the thesis project, and in consultation with the Major Advisor, the student must prepare a written proposal of the work to be undertaken during the course of the degree. The proposal is required for both the Field/Laboratory and Literature Review Thesis options. The purpose of the proposal is to help the student and the Advisory Committee make a realistic evaluation of the proposed work with respect to originality, feasibility, time required, and results. Students should follow the general outlines shown below in preparation of the proposal, although the Major Advisor may stipulate format changes if desired. Length, breadth, and scope of proposals will vary depending on the nature of the specific project and area of study. The student should consult with the Major Advisor and other Advisory Committee members regarding the specific requirements of the proposal.

Suggested Format – Field/Laboratory Thesis Option:

Title Page:

Include the title of your project, your name, the names of the Advisory Committee members (Major Advisor listed first and remaining members in listed alphabetical order), and the date.

Literature Review/Introduction:

Review the literature with the goal of developing a sound basis for investigating the chosen research problem. Identify a specific research question and provide ample evidence in the form of references to show the need for additional research in this area. Be sure to address work by other authors leading to the project you have developed.

Project Objectives:

State the specific hypotheses or objectives to be addressed and how fulfillment of these objectives/hypotheses will contribute to the current state of knowledge in the chosen research area.

Materials and Methods:

Explain how the research will be conducted and the materials that will be needed to perform the experiments/study. Describe specific procedures, the field/laboratory design, and statistical analyses to be performed.

Preliminary Data and/or Expected Outcomes:

Provide any preliminary data and/or describe the expected outcomes of the research. Explain the significance of this work to the specific research area.

Timeline:

Construct a time table which shows the expected dates for the start and completion of each phase of the project.

Literature Cited:

Provide citations for all materials used in the proposal using a citation format approved by the Major Advisor.

Figures/Tables:

Figures and tables may be included in the proposal as appropriate.

Suggested Format – Literature Review Thesis Option:

Title Page:

Include the title of your project, your name, the names of the Advisory Committee members (Major Advisor listed first and remaining members in listed alphabetical order), and the date.

Statement of Topic and Need:

Identify a specific study area and illustrate the need for a review of previous research on the topic. Topics should be broad enough to allow for a thorough review of previous and current peer-reviewed analysis on the subject.

Objectives:

State the specific objectives to be addressed during the review process.

Outline/Overview:

Provide an outline or overview of materials to be used and/or information to be gathered to meet the stated objectives.

Expected Outcomes:

Explain the significance of this work and how fulfillment of the objectives will contribute to the current state of knowledge in the chosen study area.

Timeline:

Construct a time table which shows the expected dates for the start and completion of each phase of the project.

Literature Cited:

Provide citations for all materials used in the proposal using a citation format approved by the Major Advisor. It is common for this type of thesis to contain more cited literatures than a thesis based on original research.

Figures/Tables:

Figures and tables may be included in the proposal as appropriate. Students are not allowed to copy figures and tables from published literature without the express written consent of the original author(s).

Drafting and Submitting a Thesis Proposal:

The student should submit a draft of the proposal to the Major Advisor before submitting the proposal to the Advisory Committee. Multiple revisions and drafts may be required before the Major Advisor approves submission of the proposal to the Advisory Committee. Once a draft of the proposal is agreed upon by the student and the Major Advisor, it should be submitted to the Advisory Committee for further review. A research proposal meeting must be held to discuss the proposal. The Advisory Committee must have your thesis proposal at least one week prior to the meeting to approve the proposal (see page 12 for additional rules regarding this meeting).

THESIS GUIDELINES

General Information:

The Master's Thesis is the "capstone" of the M.S. in Biology Program. As a Candidate completing a thesis, it is important that you follow the instructions of your Advisory Committee concerning the preparation of your thesis.

Graduate College Thesis Requirements:

The requirements discussed below apply to both the Field/Laboratory Thesis option and the Literature Review Thesis option.

General Requirements:

- Complete a Title Page for your thesis as shown in Appendix IV.
- Complete a Signature Page as shown in Appendix V.
- Complete Thesis Abstract Page as shown in Appendix VI.

These three pages are turned in to the Graduate College upon successful defense of your thesis. The first two pages also are the first two pages of your completed thesis (see below).

Provide a minimum left-side margin of 1.5 inches to allow for proper binding of your thesis after completion. Other than the introductory/cover pages, the Graduate College has no formal requirements for formatting the thesis. Follow the guidelines of your Advisory Committee for formatting other margins and the remainder of your thesis.

Thesis Summary Document:

The student is required to prepare a Thesis Summary Document. This document must be submitted to the Graduate College two weeks prior to the defense date (it should be submitted at the same time as Form VI). The intent is to provide an opportunity for the student to verbalize his/her rationale for key research decisions and thus to assist him/her in defending those rationales before his/her Advisory Committee. The document must include:

1. Statement of the Problem or Issue (one paragraph)
2. Brief Summary of the Literature (one or two paragraphs)
3. Thesis Statement (one or two sentences)
4. Statement of the Research Methodology (one sentence)
5. Brief Summary of Findings (one paragraph)
6. Confirmation, Modification, or Denial of Hypothesis (one sentence)
7. Statement of the Significance of the Findings (one or two paragraphs)
8. Suggestions for Future Research (one or two sentences; optional)
 - See Appendix VII for an example of the Thesis Summary Document.

Biology Department Thesis Requirements:

Unless otherwise stated, the information below applies to both the Field/Laboratory Thesis option and the Literature Review Thesis option.

Sequence of Materials:

The sections of the thesis will vary as a function of unique requirements dictated by a particular

discipline. Consult with your Major Advisor and Advisory Committee to determine the organizational style and material to be included. Additionally, consult the theses stored in the Biology office for ideas of formatting and arrangement of sections. Although every thesis may not contain each of the sections listed below, this general sequence should be followed when possible.

1. **Title Page:** The Title Page must be symmetrically balanced, based on an imaginary line drawn 3 inches to the right of the center of the page. The nature of the paper and exact title of the degree sought must be given on this page (see example, Appendix IV). The title of the thesis should be consistent with the title that was submitted to the Graduate College with the Plan of Study. The first letter of each word in the title should be capitalized and all other letters should be lower case. In the case of scientific names, which should be in parentheses next to common names, use italics and capitalize those letters as specified in scientific nomenclature.
2. **Signature Page:** The Signature Page must be symmetrically balanced, based on an imaginary line drawn 3 inches to the right of the center of the page. The first signature line should be designated as the Major Advisor's signature. Each Advisory Committee member should be provided with separate signature lines. All Advisory Committee members must sign *all* copies of the thesis to be printed. The signing date must be specified on this page. For an example of the Signature Page, see Appendix V.
3. **Acknowledgments:** Acknowledge sources of funding and those who contributed help toward the project. Personal acknowledgments also can be included in this section.
4. **Table of Contents:** All chapter or major headings must be identified by page number.
5. **List of Tables:** Page numbers for each table must be cited.
6. **List of Figures or Illustrations:** Page numbers for each figure or illustration must be cited.
7. **Thesis Abstract:** The Thesis Abstract should not be written until the rest of the thesis is complete and it must summarize the entire thesis. Do not cite references, taxonomic authorities, or use abbreviations (unless specified and repeated) in the abstract. Be concise, but include the purpose, materials and methods (if Field/Laboratory Thesis option), results, and significance of findings. See Appendix VI for an example of the correct format.
8. **Body of the Text:** This will vary by discipline and style preferred by the Major Advisor. See the "Suggested Formats" sections below for commonly used thesis formats in the department.
9. **Bibliography, References, or Literature Cited:** Consult with the Major Advisor and Advisory Committee for the preferred style. In most cases, the style will be specified by the journal in which the Candidate and Major Advisor intend to publish the material.

10. Appendices: If appropriate, additional materials can be included in the appendices. In the case of the Department of Biology, this may include raw data and lists of specimens analyzed.

Pagination:

The Title and Signature pages must be labeled as page "i" and "ii," respectively. For subsequent preliminary pages (which includes numbers 3-7 above), label with small Roman numerals (iii, iv, v, vi, etc.). The Body of the Thesis will begin the use of Arabic numerals (starting with 1).

Margins:

The left margin must be 1.5 inches (to leave space for binding); top, right, and bottom margins must be 1 inch. Page numbers must be exactly 1 inch from the top or bottom, depending on the preferred style or specific target journal. At least one full line should separate the page number from the text.

Headings:

Headings should follow a consistent format, though the style may vary depending on the preferences of the Major Advisor or specific target journal. One example is: main headings (INTRODUCTION, MATERIALS AND METHODS, etc.) are in all capitals centered at the top of the page; sub-headings have the first letter of each word capitalized and are centered at the beginning of the heading; sub-sub headings are underlined and indented for the beginning of the paragraph for that heading. Bold face font also can be used for headings/subheadings. If a heading or first line of a paragraph is the last line of the page, move it to the beginning of the next page.

Suggested Formats – Body of the Thesis – Field/Laboratory Thesis Option:

Traditional Format:

The traditional thesis format includes four chapters: an Introduction with a literature review, Materials and Methods, Results, and Discussion. This format is suggested if the Candidate will not produce at least two independent manuscripts from the thesis research. There are variations of this format, depending on the Major Advisor and/or Advisory Committee. The sections outlined below are what most students use in writing their traditional thesis.

- Introduction: Identify the scientific problem that was addressed during the course of the thesis research. Justify the problem and why a solution was important through a complete review of the literature. Acknowledge related work and how the research contributed toward what had already been done. Specify the objectives and what fulfillment of those objectives would mean to the scientific community.
- Materials and Methods: Describe specific procedures undertaken during the course of the research, the field/laboratory design used, and statistical analyses performed.
- Results: This section includes data, tables, graphs, and figures. The data presented should address the objectives presented in the introduction. A well-written document will thoroughly describe what is presented in tables, graphs, and figures.
- Discussion: Comparison of the results to other published research should be included. Explain why the new research agrees or disagrees with what has been published. An

amalgamation of the thesis results and what has been published in the literature should be used to draw conclusions. Conclusions should address the major findings of the research and how these findings fulfill the objectives. A solution to the original scientific problem should be provided and future research needs in the field should be addressed.

Publication Format:

The publication format includes three general sections, though the number of chapters will vary based on the number of manuscripts that will be generated from the thesis research. The chapters include: a General Introduction and literature review, two or more Manuscript chapters to be submitted as a result of the research, and a General Summary. This format is suggested if the Candidate will produce at least two independent manuscripts from the thesis research. There are variations of this format, depending on the Major Advisor and/or Advisory Committee.

- **General Introduction:** This section should present the broad concept to be addressed in the thesis and should act as an introductory link between the Manuscript chapters. A thorough literature review should be included in this section. The final paragraph of the introduction should indicate the main objective(s) of each Manuscript chapter. If the Manuscript chapters follow different journal formats, it is helpful for the review process to indicate that in this final paragraph.
- **Manuscripts:** The chapters included in this section will vary depending on the journal format(s) used and requirements of the Major Advisor and Advisory Committee. Each Manuscript chapter should address specific aspects of the broad question discussed in the General Introduction.
- **General Summary:** This section should present a final summation of the thesis research and should link the conclusions of the Manuscript chapters to address the broader concept(s) proposed in the General Introduction. Comparisons to other published research should be included. A solution to the original scientific problem may be provided and future research needs in the field should be addressed.

Suggested Format – Body of the Thesis – Literature Review Thesis Option:

This is one suggested format for this type of thesis. You should consult with your Major Advisor and Advisory Committee prior to beginning your thesis to discuss the thesis format.

- **Introduction:** Identify the topic that was addressed during the course of the thesis work. Justify the study topic and why a complete review of the literature was necessary. Specify the objectives and what fulfillment of those objectives would mean to the scientific community.
- **Literature Review:** This section should contain a thorough analysis of the materials reviewed during the course of your thesis work. The review should address the stated objectives. It should be a synthesis of current knowledge of the study topic, not simply a summary of important works, and it should generate new insights or perspectives.
- **Conclusions:** This section should summarize the major findings of the review and how these findings fulfill the stated objectives. Future needs in the field should be addressed.

Thesis Review:

First Round of Revisions:

The thesis should be written and revised several times under the direction of the Major Advisor. When approved by the Major Advisor, the revised draft of the thesis may be submitted to members of the Advisory Committee for further review.

Second Round of Revisions:

At least two weeks must be provided for individuals of the Advisory Committee to read and review the thesis. They in turn, will provide suggestions which should be used to revise the thesis. Further submission and revision of the thesis will follow until all committee members are satisfied with the document. Once the Advisory Committee is satisfied, the thesis defense can be scheduled.

Third Round of Revisions:

Even if the approved version of the thesis passes during the oral defense, further revisions may be necessary before Advisory Committee members will sign the Signature Page.

Final Draft of the Thesis:

After the public presentation and oral defense, and once the final draft of the thesis is complete, the Candidate will make at least three copies to be taken to the library for binding. Each of the copies must bear the original signatures of the Advisory Committee. Additional copies may be made for the student, Major Advisor, Advisory Committee members, and others, but must be paid for by the student.

Documents for the Graduate College:

Upon successful completion of the thesis, the Candidate is required to turn in to the Graduate College a copy of the Title Page, Thesis Abstract, and original Signature Page.

Public Presentation and Oral Defense:

General Information:

Candidates are required to make a formal presentation of the thesis to the Advisory Committee and the public. The presentation typically lasts 45 minutes with additional time for questions, but the Candidate should determine the time limit with the Major Advisor prior to preparing the presentation. No less than two weeks prior to this defense, a copy of the thesis must be given to each Advisory Committee member. Candidates are required to advertise the oral defense to the Department of Biology by emailing the defense flyer to departmental administrative assistants, who will send it to faculty and graduate students in the department. Candidates must post the defense flyer on bulletin boards in Howell Hall, and place an abstract and a copy of the defense flyer in the main Biology office. Campus-wide notices to other departments are optional. Announcements must be disseminated at least one week prior to the oral defense. The oral defense by the Candidate is to be followed by a period of questioning which is open to all those who attend. Following public questioning, everyone except the Candidate and Advisory Committee will be dismissed by the Major Advisor. The Candidate will then be examined further regarding the thesis research and other general questions by the Advisory Committee (see the Comprehensive Oral Examination section below). The public presentation and oral examination

before the Advisory Committee will occur on the same day, with the examination immediately following the public defense. In exceptional cases, the public presentation and oral examination by the Advisory Committee may be scheduled on separate dates, but prior permission from the Advisory Committee members must be obtained. A representative from the Graduate College must attend the public presentation.

Thesis Defense Dates:

The thesis defense is to be held no later than two weeks before the beginning of the final examination week for the Fall and Spring semesters and no later than 10 days prior to the beginning of the final examination week for the Summer session. The public presentation may not be scheduled during intersessions, holiday breaks, or weekends. The deadline for turning in the Title page, Signature page, and Thesis Abstract to the Graduate College is the last day of the semester, including summer semesters.

Comprehensive Oral Examination:

In addition to the public presentation of the thesis, a private oral examination will be conducted by the Advisory Committee. The oral examination will include a defense of the thesis to the Advisory Committee, as well as questions over a broad spectrum of biology. It is recommended that the student speak with members of the Advisory Committee prior to the oral examination to determine what topics might be included on the exam. At the conclusion of the exam, the Major Advisor will ask the student to step out while the Advisory Committee discusses the exam results. The Advisory Committee will decide the results of the examination and inform the student of the decision immediately.

Satisfactory Examination:

A satisfactory examination is defined as the unanimous vote of the Advisory Committee for approval. At the conclusion of a satisfactory examination, each member of the Advisory Committee must sign *all* copies of the Signature Page.

Upon successful completion of the examination and all other degree requirements, the Advisory Committee will recommend awarding the M.S. degree by the Graduate College.

Unsatisfactory Examination:

If the Candidate fails to receive a unanimous vote from the Advisory Committee, the Major Advisor must facilitate the following:

1. Immediately notify the Candidate of the difficulty or problem areas associated with the failure to receive a satisfactory vote.
2. Establish a time-line for a satisfactory revision of the thesis, presentation of the oral defense, and/or completion of a second oral examination.

Failure to provide a satisfactory revision of the thesis, complete an oral defense, and/or a second failed oral examination will result in termination of the degree program. Form VII must be submitted to the Biology Graduate Program Advisor.

Final Disposition of the Thesis:

The information below is taken from the Graduate Catalog.

A Candidate completing his/her thesis for his/her master's degree must submit the original Title Page, Signature Page, Thesis Abstract, and Thesis Summary Document to the JCGS **no later than the last day of classes** in the same term they plan to graduate. These documents must be on file to graduate. For additional information, contact the Graduate Program Specialist at:

Syretha Leverett
JCGS Graduate Program Specialist
Slleverett2@uco.edu
405-974-2527

Following successful public defense of the thesis, students must submit the thesis in both paper and electronic formats. For additional information, visit Chambers Library website at <http://library.uco.edu/services/thesis.cfm> or call Special Collections at 405-974-2882.

1. Paper Submission Process

- a. Each student completing a thesis for the master's degree program must submit two (2) copies of his/her thesis for binding to Archives & Special Collections in the Max Chambers Library.
- b. The primary responsibility for content, form, and style of the thesis rests with the student and the student's Advisory Committee members. The student is responsible for the complete and accurate collation of the thesis before submitting it to the library for binding.
- c. Both copies of the thesis must be presented with an original Signature Page signed by all members of the Advisory Committee, on white 25-100% cotton or rag paper and not bound or punched.
- d. After the thesis returns from the bindery, one copy will be placed in the Archives Thesis Collection for reference only, and the second copy will be forwarded to the academic department which supervised the work. A full text, electronic version of your thesis will be made available through the UCO Chambers Library online catalog.
- e. It takes approximately two months for the binding process to be completed. Students may pick-up their additional copies in the Archives & Special Collections Monday through Friday from 8:30am to 4:30 pm.

Thesis Costs	
\$20.00	Cost for binding two hard copies of thesis, paid by cash or check at Archives and Special Collection Department at the Library
\$20.00	Total Required Costs
Optional Thesis Costs	
\$10.00 paid by check or cash	Cost per copy for additional student-requested copies of Thesis.
\$65.00	Costs to have thesis registered with US Copyright Office (Optional, made with credit card payment on the ProQuest website).
\$5.00	Mailing fee if you wish to have your copies mailed.
\$55.00	Indexing and abstracting (made with credit card payment on the ProQuest website). Optional, not required.

2. Electronic Submission Processes

After a successful public defense of the thesis, students must submit one (1) electronic copy of the thesis to: <http://dissertations.umi.com/uco>. The electronic copy must be the same, content and pagination as the paper copy submitted for binding.

Instructions are available at:

<http://dissertations.umi.com/uco>. For questions regarding the electronic thesis submission process, please contact:

Nicole Willard
 Archivist
 Chambers Library
 nwillard@uco.edu
 405-974-2885

For additional information contact the Library's Archives & Special Collections at 405-974-2882 or go to our Website at: www.uco.edu/graduate/current/thesisprep.asp

(End of Graduate Catalog summary)

GRADUATE STUDENT SUPPORT

General Information:

Information regarding all forms of financial aid for graduate students can be found through the Graduate College website (<http://www.uco.edu/graduate/financial/index.asp>). A PDF of this information also is available at:

<http://www.uco.edu/graduate/financial/FinAidForGradStudents.pdf>.

Graduate Student Assistantships:

Acceptance of a student into the Department of Biology M.S. program does not guarantee that the student will be provided with financial assistance. Both Graduate Teaching Assistantships (TAs) and Graduate Research Assistantships (RAs) are available. Availability of both TAs and RAs depends on the number of students competing for the positions and availability of funds. Other forms of support are discussed below.

Graduate Teaching Assistantships:

Contact the Biology Graduate Committee Chair (Graduate Program Advisor) to inquire about the availability of a TA. To apply, complete the application form in Appendix VIII. Graduate TAs will be awarded by the Biology Graduate Committee with assistance from the Biology Department Chair. TAs will be awarded only to students who remain in good standing in the department. See Appendix IX for the criteria used to evaluate good standing. TAs typically come with a stipend and a tuition waiver.

Graduate Research Assistantships:

Graduate RAs can be obtained in the following ways: the student has applied for and received a student Research, Creative, and Scholarly Activities (RCSA) grant through the UCO Office of High Impact Practices (OHIP); the faculty mentor has applied for and received a faculty RCSA grant through the UCO Office of Research and Sponsored Programs; the student or faculty mentor has applied for and received a Student Transformative Learning Record – Transformative Learning (STLR-TL) grant; the student or faculty mentor has applied for and received external funding that contains money available for student salaries. Grants awarded to faculty mentors do not guarantee RAs for graduate students. RAs awarded through UCO RCSA typically include a stipend and a tuition waiver. RAs awarded through external grants will vary with regards to associated benefits (tuition waiver, health benefits, etc.) depending on the granting agency. STLR grants do not include tuition waivers.

Information for student RCSA grants can be found at: <http://www.uco.edu/academic-affairs/ohip/RCSA/index.asp>.

Departmental Tuition Waivers:

Applications are available in the spring semester and will be awarded for the following academic year. The deadline typically occurs in February and the application can be found at:

<http://www.uco.edu/cms/biology/Graduate%20Program1/financial-aid-links.asp>.

Departmental Scholarships:

The Department of Biology is able to offer several scholarships through the UCO Foundation. Applications are available at the end of the fall semester and typically are due in February of the spring semester. The application can be found at:

<http://www.uco.edu/cms/development/scholarship.asp>.

Information for university-wide scholarships can be found at: <http://www.uco.edu/academic-affairs/ohip/Scholarships%20and%20Fellowships/index.asp>.

Travel Funds:

Student RCSA Travel Presentation Grant – This grant is offered through OHIP and is intended for travel to present research at a conference. Information regarding this travel award and the application can be found at: <http://www.uco.edu/academic-affairs/ohip/student-travel-presentation-grants.asp> .

Additional travel funds may be available through your faculty mentor.

APPENDIX I – GRADUATE STUDENT CHECKLIST

First semester enrollment: Speak to your Major Advisor prior to enrolling in courses your first semester. Courses completed as a graduate student before formation of the Advisory Committee will be accepted as part of the Plan of Study at the discretion of the student's Advisory Committee.

Completed	Item	Recommended/Required Completion Dates
	Form Advisory Committee (Form I)	First semester
	File Form I with Graduate College and Biology Graduate Program Advisor	Immediately following meeting (must be filed by the end of the first semester to remain in good standing in the department)
	Develop Plan of Study* (Form II)	First semester
	File Form II with Graduate College and Biology Graduate Program Advisor	Immediately following meeting (must be filed by the end of the second semester to remain in good standing)
	Submit Thesis Proposal** (Form III)	End of second semester
	File Form III with Graduate College and Biology Graduate Program Advisor	Immediately following meeting (must be filed by the end of third semester to remain in good standing)
	Progress Meetings (Form IV)	Once per academic year
	File Form IV with Biology Graduate Program Advisor	Immediately following meeting (must be filed at least once per academic year to remain in good standing)
	Enroll in Thesis Hours***	Last two semesters (three hours each of last two semesters)
	Schedule a Thesis Defense Date**** (Form VI)	Last semester (defense must occur at least two weeks before finals week in fall and spring, or at least 10 days prior to finals week in the summer semester)
	File Form VI with Graduate College and Biology Graduate Program Advisor	Must be done at least two weeks prior to defense date
	Submit Thesis Summary Document to Graduate College	Must be done at least two weeks prior to defense date (submit with Form VI)
	Advertise Public Thesis Defense	Must be done at least one week prior to defense date
	File Thesis Page, Signature Page, and Thesis Abstract with the Graduate School	Upon successful completion of the thesis defense (must be submitted by last day of classes)
	Submit Hard Copies of Final Thesis to Library for Binding (Minimum 2 copies); Submit Electronic Copy of Final Thesis to Library	Once final draft is complete

*Any change(s) to the Plan of Study during the course of the degree requires a new Form II to be filed with both the Graduate College and the Biology Graduate Program Advisor.

**The Advisory Committee must have your thesis proposal at least one week prior to the meeting to approve the proposal. A full description of the thesis proposal guidelines can be found starting on page 13.

***Once you begin enrollment in Thesis Hours, you must enroll in at least 1 Thesis Hour per semester until you graduate. See page 8 for Thesis Hour information.

****Advisory Committee members must receive a copy of your thesis at least two weeks prior to the defense date. A defense date cannot be scheduled until all members of the Advisory Committee agree the thesis is ready to defend. A full description of the thesis guidelines can be found starting on page 16.

APPENDIX II – FORMS FOR THE M.S. IN BIOLOGY

Forms I-VII are to be filled out as graduate student's progress through the Master's Program. Once completed, the forms should be turned in to the individuals indicated on each form. Copies should be retained by the Candidate and filed with the Major Advisor (if desired).

ADVISORY COMMITTEE APPROVAL FORM FOR M.S. IN BIOLOGY

(Form I)

Date: _____

Student Name: _____

Title of Research Project (if known):

Major Advisor: _____
(Printed name) (Signature)

Advisory Committee Members:

_____	_____
(Printed name)	(Signature)
_____	_____
(Printed name)	(Signature)
_____	_____
(Printed name)	(Signature)

Form I is to be submitted to the Dean of the Jackson College of Graduate Studies and the Biology Graduate Program Advisor.

**FORMAL PLAN OF STUDY FOR M.S. IN BIOLOGY
INCLUDES LIST OF COURSEWORK REQUIRED FOR THE DEGREE
UNIVERSITY OF CENTRAL OKLAHOMA**

(Form II)

Date: _____

Student Information:

Name: _____ **UCO ID #:** _____

Address: _____ **Phone:** _____

B.S. Degree (Major): _____ **B.S. Institution:** _____

Date of Graduation: _____

Advisory Committee Members (print or type)

(Major Advisor)

(Form II continued)

PROGRAM COURSEWORK:

Transfer Courses (list all courses transferring):

UCO Coursework (list all courses taken or to be taken at UCO):

Those courses marked above with ** are to count as credit hours toward the M.S. in Biology Degree (a total of 32 graduate hours at the 5000 level is required). Other courses listed are additional requirements or deficiencies.

Thesis Topic:

Advisory Committee Approval:

(Major Advisor Signature)

Biology Graduate Program Advisor Approval: _____

Form II is to be submitted to the Dean of the Graduate College and the Biology Graduate Program Advisor.

**THESIS PROPOSAL APPROVAL FOR M.S. IN BIOLOGY
UNIVERSITY OF CENTRAL OKLAHOMA**

(Form III)

Student Name: _____

Major Advisor: _____

Title of Research Project:

Advisory Committee Approval

(Major Advisor Signature)

Date: _____

Form III is to be filed with the Graduate College Office and the Biology Graduate Program Advisor.

NOTIFICATION OF ADVISORY COMMITTEE MEETING

(Form IV)

This is to notify the Biology Graduate Program Advisor that the following student has held the required Advisory Committee meetings and to record the student's progress through the program. Information on this form also will be used by the Graduate Committee to assess the Biology Graduate Program.

Student Name: _____ **Semester:** _____ **Year:** _____

Type of Meeting (circle all that apply): **Plan of Study** **Research Proposal** **Progress Report**
Other (Specify)

List/describe any and all significant changes in the research project. If no changes are necessary, so indicate.

Please report if you have accomplished any of the following since your last Advisory Committee Meeting.

Presentation at a research conference – Please provide the title, meeting name, meeting location, and meeting date.

Submission of a grant – Please provide the title, granting agency, and grant status (e.g., in review, funded, not funded).

Submission of a manuscript to a peer-review journal – Please provide a full citation.

Student Signature: _____

Major Advisor Signature: _____

Form IV is to be filed with the Major Advisor and the Biology Graduate Program Advisor.

MAJOR ADVISOR EVALUATION OF STUDENT PROGRESS

(Form V)

This form is to be filled out by the Major Advisor after the Advisory Committee meeting or when students are applying for a TA. Students must provide their advisor with this form during the Advisory Committee meeting or when they apply for a TA.

Advisors, please evaluate your student's progress since their last Advisory Committee meeting. This form will be used by the Graduate Committee to determine whether students remain in good standing with the Department of Biology. It is up to the discretion of the advisor as to whether this form is shared with the student.

Student Progress:

Satisfactory

Unsatisfactory

Comments (Required if Unsatisfactory):

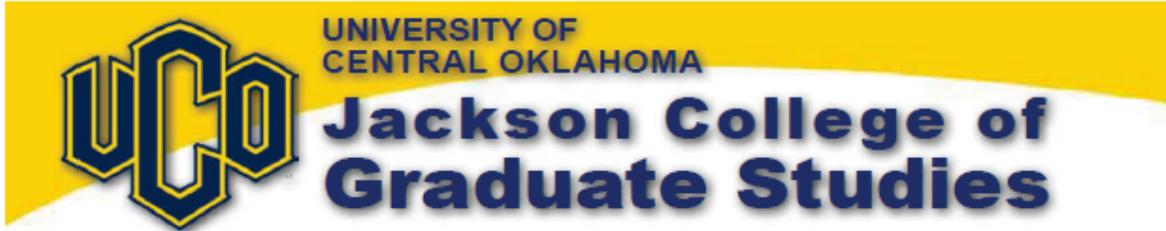
Form V is to be filed with the Biology Graduate Program Advisor.

THESIS DEFENSE SCHEDULING FORM

(Form VI)

This form is a proxy for the original form. Please visit the website listed below to download the official form:
<http://www.uco.edu/graduate/current/ThesisDefenseSchedulingForm.pdf>

This form must be submitted to the Graduate College at least two weeks prior to the defense date. Please submit a copy of this form to the Biology Graduate Program Advisor.



Please allow at least two (2) weeks to schedule a Graduate Council Representative for your Thesis Defense. Be sure to include a summary of your Thesis so that the appropriate Graduate Council Representative can be scheduled for your public defense. Thank you.

Download and fill out the form below. Save it to your device and email it to:
Ms. Lana Canale, Manager for JCGS
lcanale@uco.edu
405.974.3494

Thesis Defense Scheduling Form
Public Defense of Thesis

Student's Name: _____
UCO Student ID: _____
Degree Program: _____
Thesis Title: _____
Thesis Committee chairperson: _____
Thesis Defense Date: _____
Thesis Defense Time: _____
Thesis Defense Location: _____

Thesis summary: Please see requirements on p. 25 of the catalog. Available here: <http://www.uco.edu/graduate/catalog/index.asp>

DEGREE TERMINATION FORM

(Form VII)

This form should be filled out for by the Major Advisor when a graduate student's degree is terminated for any reason.

Student Name: _____

Major Advisor: _____

Date of Termination:

Reason for Termination (check all that apply):

_____ Unsatisfactory progress in degree (please explain below)

_____ Failure to submit thesis

_____ Failure to defend thesis

_____ Failure of second oral examination

_____ Other (please explain below)

Explanation of termination:

Major Advisor Signature: _____

Form VII is to be filed with the Biology Graduate Program Advisor.

APPENDIX III – GRADUATE COURSE OFFERINGS

Courses listed in this appendix are offered only through the Biology Department. Students are allowed to take courses in other departments with permission from the Advisory Committee.

Regular Offerings:

For courses with “Varies” as the Instructor, speak with your Major Advisor.

Course #	Course Title	Instructor(s)	Semester(s) Offered
5012	Introduction to Biological Research	Butler	Every Fall
5024	Freshwater Ecology and Laboratory	Bass	Spring of Odd Years
5044	GIS and Ecology	Butler	Spring of Odd Years
5103	History and Nature of Science	Barthell	Every Spring
5134	Developmental Biology and Laboratory	Seagraves	Every Spring
5204	Plant Ecology and Laboratory	King	Every Fall
5264	Mammalogy and Laboratory	Jackson	Every Fall
5294	Plant Taxonomy and Laboratory	Caddell	Every Spring
5324	Marine Ecology and Laboratory	Bass	Spring of Even Years
5343	Molecular Biology Techniques and Laboratory	Haynie	Every Fall
5354	Plant Anatomy and Laboratory	Bidlack	Every Fall
5504	Mycology and Laboratory	Ovrebø	Fall of Odd Years
5515	Pathogenic Microbiology and Immunology and Laboratory	Brennan	Every Fall and Spring
5622	Methods of Human Dissection and Prosection	Cleveland	Every Fall and Spring
5723	Biometrics	Butler	Every Spring
5734	Ornithology and Laboratory	Butler	Spring of Even Years
5743	Population Genetics and Laboratory	Haynie	Every Spring
5754	General Entomology and Laboratory	Lord	Fall of Even Years
5763	Biology of Cancer	Kotturi	Every Spring
5774	Parasitology and Laboratory	Lord	Every Spring*
5812	Teaching and Learning in the Science Classroom	Allan	Every Fall
5844	Virology and Laboratory	Kotturi	Every Fall
5853	General Methods of Teaching Science	Allan	Every Spring
5910	Seminar/Special Topics	Varies	Every Semester**
5930	Individual Study in Biology	Varies	Every Semester
5990	Thesis	Varies	Every Semester

*This course also may be offered in the fall semesters based upon student demand.

**Irregular in the summer semester.

Irregular Offerings:

Check with the course instructor if you are interested in taking one of these courses to determine the next time it will be offered. The listing in the “Semester(s) Offered” column indicates when these courses have been offered in the past. For courses with “Varies” as the Instructor, speak with your Major Advisor.

Course #	Course Title	Instructor(s)	Semester(s) Offered
5254	Animal Behavior	Baird	Fall
5454	Molecular Cell Physiology and Laboratory	Vaughan	Fall and Spring
5524	Aquatic Entomology and Laboratory	Bass	Summer
5940	Field Study in Biology	Varies	Every Semester
5950	Internship in Biology	Varies	Every Semester
5970	Study Tour	Varies	Every Semester

Additional courses listed in the Graduate Catalog that do not appear here are rarely offered through the department. Speak with your Major Advisor if you are interested in one of these rarely offered courses.

APPENDIX IV – TITLE PAGE EXAMPLE

UNIVERSITY OF CENTRAL OKLAHOMA
Edmond, Oklahoma
Jackson College of Graduate Studies

I Know Why the Caged Dog Howls

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

In partial fulfillment of the requirements

For the degree of

MASTER OF SCIENCE IN BIOLOGY

By

Martha Mostly

Edmond, Oklahoma

2009

APPENDIX V – SIGNATURE PAGE EXAMPLE

I Know Why the Caged Dog Howls

A THESIS

APPROVED FOR THE DEPARTMENT OF BIOLOGY

Month Year

By _____
Name Committee Chairperson

Name Committee Member

Name Committee Member

Name Committee Member

APPENDIX VI – THESIS ABSTRACT EXAMPLE

ABSTRACT OF THESIS

University of Central Oklahoma

Edmond, Oklahoma

NAME: _____

TITLE OF THESIS: _____

DIRECTOR OF THESIS: _____

PAGES: _____

ABSTRACT:

Type in text.

APPENDIX VII – THESIS SUMMARY DOCUMENT EXAMPLE

Thesis Summary Document

Thesis Title

Monitoring Temperature Distribution during Laser-Tissue Interaction for
Cancer Treatment Using Magnetic Resonance Thermometry

Akhee Sarker

Department of Engineering and Physics

Wei R. Chen, Ph.D.

Advisor

Statement of the Problem or Issue

One of the many challenges facing modern medicine is the ability to diagnose and treat metastatic cancers. Some of the most common options for patients, who are diagnosed with metastatic cancer, are chemotherapy, radiation, and surgery [1-3]. However, patients are well aware of the dire consequences of these drastic measures. For many years, standard cancer therapies have been sought to target a specific malignant cell, but with only limited success [4-7]. Unfortunately, these successes have also been accompanied by varying degrees of toxicity, and there is currently no standard therapy that can eradicate clinical disease and prevent recurrence while leaving normal tissue unharmed. In fact, the treatment of primary tumors using local interventions, such as surgery and radiation, may stimulate the growth of metastases at remote sites. Many approaches have been tried to induce a prolonged systemic immune response to fight metastatic tumors. Among these approaches, laser immunotherapy, developed by Dr. Wei Chen's research group, has shown great potential as a non-invasive alternative due to its ability of targeting and destroying cancerous cells while leaving minimal damage to surrounding tissues. More importantly, laser immunotherapy can also induce long-term systemic, tumor-specific immunological responses, through local treatment. Selective photothermal interaction is a crucial component of laser immunotherapy and temperature distribution in target tumor tissue could determine the outcome of cancer treatment. The best way to optimize the selective photothermal effect is through real-time, three-dimensional observation of temperature distribution in target and surrounding tissues. Currently, the only non-invasive method to achieve such an observation is through Magnetic Resonance Thermometry (MRT). This study is to investigate the feasibility of monitoring temperature distribution during laser irradiation using MRT in an effort to optimize laser immunotherapy.

Brief Summary of the Literature

There are several temperature-sensitive Nuclear Magnetic Resonance (NMR) properties that could be used for MRT, such as the relaxation time, diffusion coefficient of water, and the proton resonance frequency (PRF). The PRF shift method possesses many attributes that make it suitable for high-temperature thermal therapies, including good temperature sensitivity, linearity and reversibility with temperature, and ease of measurement and interpretation. The time a proton takes to decay into their initial position can be manipulated by an outside heat source such as a laser beam by the following equation,

$$\Delta T = \gamma B_0 a T E' \quad (1)$$

where ΔT is the change in temperature, $\Delta \phi$ is the change in phase, γ [rad/T] is the gyromagnetic ratio, B_0 is the MRI magnetic field which is independent of temperature, a is the temperature-dependent water chemical shift in ppm/°C which is constant within measurement range and TE is the time of echo formation of the field echo pulse sequences. Phase ϕ is the relative position of the proton which can be calculated from the imaginary and real data. The change of the phase can be determined by,

$$\phi = \text{ArcTan} \frac{\text{Re}_i - \text{Re}_r}{\text{Re}_r + \text{Im}_i} \quad (2)$$

where Re and Im represent the real and imaginary components of the complex signal of MR image. Phase change can only be due to an external force (laser); therefore we can correlate to temperature change.

Thesis Statement (Hypothesis)

Based on literature and on our previous experience, it is hypothesized that precise, real-time, three-dimension temperature distribution can be obtained using MRI technology and such temperature distribution could be used to optimize laser immunotherapy for the treatment of metastatic tumors.

Statement of the Research Methodology

The study determines a 3-D temperature distribution in target samples during laser irradiation using a 7.1 Tesla superconducting MRI system through data analysis using a special Mathematica algorithm.

Confirmation, Modification, or Denial of Thesis (Brief Summary of Findings)

Phantom gels with ICG of 0.056% concentration and 2.0 watt/cm² of laser power density showed more selectivity. Phantom gels with 0.08% of ICG and 1.0 watt/cm² of laser power density showed a considerable temperature elevation in the range of 10-35 °C. We confirmed that the chemical shift in tissue is nearly independent of water proton, which was determined to be - 0.01 ppm/°C with deviation of 0.001 ppm/°C. With a high temperature elevation during laser irradiation, a lowest TE with the three NEX is optimal. Calibration using thermocouples showed that the temperature distribution obtained by MRT is highly accurate.

Statement of the Significance of the Findings

The experimental results indicated the feasibility of an accurate, real-time 3D temperature mapping inside tissue during laser treatment. By measuring the entire thermal history throughout the experiment, one can give a measurement of tissue temperature distribution as a function of phase difference. The accurate distribution of the temperature is a prerequisite for the successful application of the laser immunotherapy in the treatment of metastatic cancer.

Suggestions for Future Research

This approach can be applied over a range of frequencies, tissues and temperatures; it should provide a new and non-invasive means of measuring tissue temperature distribution with proper ICG concentration to destroy the tumor cells while leaving the surrounding healthy tissue undamaged to improve laser immunotherapy and future therapeutic treatment design to enhance clinical trial.

APPENDIX VIII – TA APPLICATION
Graduate Teaching Assistantship Application
Department of Biology, UCO
Submit to Department of Biology Graduate Program Advisor

Application deadlines:

Last day of regularly scheduled classes, spring semester (current students or new students accepted for the fall semester);

Last day of regularly scheduled classes, fall semester (new students accepted for the spring semester);

Applications submitted by current students after these dates will be considered if funds are still available;

Special consideration will be given to students accepted into the M.S. program during the summer semester.

Student information:

Name: _____

Address: _____

Banner ID: _____

E-mail address at which you can be contacted during the summer: _____

Phone number at which you can be contacted during the summer: _____

M.S. Program: Biology _____ Forensics¹ _____ Major Advisor: _____

¹Forensics applicants must have a Biology background; Biology graduate students are given preference.

Number of previous semesters of TA support: _____

Degree progress:

Complete all fields with semester and year (Spring/Summer/Fall, 20XX) or NA (not applicable), do not use projected dates.

Admitted: _____ Advisory Committee formed: _____

Plan of Study filed: _____ Proposal approved: _____

Expected semester of degree completion: _____

Your Major Advisor must submit Form V before you will be considered for a TA. Newly admitted students will not be required to submit this form.

TA support requested:

Fall, year: _____

Full time (20 hrs/wk)² _____ ¾ time (15 hrs) _____ ½ time (10 hrs) _____ ¼ time (5 hrs) _____

Spring, year: _____

Full time (20 hrs/wk) _____ ¾ time (15 hrs) _____ ½ time (10 hrs) _____ ¼ time (5 hrs) _____

²Full-time and ¾ TA's are required to be available 5 days a week, including some evenings.

Tuition waiver support requested:

Fall: No. of credit hours: _____ Spring: No. of credit hours: _____

The amount awarded will depend upon the availability of funding and number of credits for which you are registered.

Please attach your Fall and/or Spring schedule (course numbers, titles, and times if known)³.

³Enrollment in 5 graduate or 6 undergraduate/graduate hours required for TAs. The Chair of the Department of Biology can write a letter requesting an exemption to this requirement if necessary.

APPENDIX IX – GOOD STANDING EVALUATION CRITERIA

Preference will be given to students that meet the following criteria when TA assignments are made.

- Deadlines on the checklist in Appendix I have been met.
 - Preference will be given to students that meet the early deadlines.
- Satisfactory progress report from Major Advisor (Form V)
- Satisfactory evaluation from course instructor (see form below)
- Satisfactory SPIE scores (scores at or above the average for the course taught)
- Good academic standing (no grades of C or lower)

Preference will be given to students early in their career (four semesters of support or less). Students in their fifth or sixth semester will be given secondary preference. Students entering their seventh (or later) semester will be placed at the bottom of the list.

Faculty preference for TAs will be taken into account by the Graduate Committee and the Department Chair when TA assignments are made.

Students who fail to meet any of the above criteria may be given low preference when TAs are assigned. Teaching assistantships can be rescinded by the Graduate Committee if criteria are not met based on the guidelines.

TEACHING ASSISTANT EVALUATION BY COURSE INSTRUCTOR
Department of Biology, UCO

Please evaluate the teaching assistant using the criteria below and provide additional comments if necessary. This information will be used when assessing TA assignments for subsequent semesters.

Student name: _____ Semester: _____

Course instructor: _____ Course name: _____

I have supervised the applicant for _____ semesters (including the current semester).

How would you assess the student's performance their duties in this course?

Unsatisfactory* ___ Satisfactory ___ Exceeds Expectations ___

Would you recommend continuing their teaching assistantship?

Yes ___ No* ___

My confidence in ranking this applicant is (circle one) very high, high, reasonable, poor.

Please check the box which most accurately describes the above student.

QUALITIES:	Below Average*	Average	Good	Excellent	Have Not Observed
Dependability, reliability					
Preparedness					
Knowledge of subject					
Lectures at appropriate level					
Rapport with students					
General communication skills					
Works well with others					
Overall ranking as a TA					

*If you rated the student as unsatisfactory or below average, or recommended that they not continue as a TA, please explain. Additional sheets may be attached if necessary.

Signature: _____ Date: _____

APPENDIX X – GRADUATE PROGRAM ASSESSMENT CRITERIA

1. Demonstrate mastery of the subject material in their specified research program
 - Successful completion of a written research proposal
 - Goal: 80% of students will submit their approved thesis proposal by the end of their second semester
 - Goal: 100% of students will submit their approved thesis proposal by the end of their third semester
 - Successful completion of a written thesis
 - Goal: 60% of students will submit their approved thesis by the end of 2.5 years
 - Goal: 80% of students will submit their approved thesis by the end of 3 years
 - Goal: 95% of students will submit their approved thesis by the end of 3.5 years
 - Successful completion of an oral defense
 - Goal: 95% of students will successfully defend their thesis
 - Successful completion of an oral exam
 - Goal: 95% of students will successfully pass their oral exams
2. Demonstrate oral and written communication skills
 - Successful completion of a written research proposal
 - Goal: 80% of students will submit their approved thesis proposal by the end of their second semester
 - Goal: 100% of students will submit their approved thesis proposal by the end of their third semester
 - *Presentation at a research conference
 - Goal: 100% of students will present either a poster or an oral paper at a research conference
 - *Submission of a SRCSA (or other) grant
 - Goal: 80% of students will submit an internal or external grant
 - Successful completion of a written thesis
 - Goal: 60% of students will submit their approved thesis by the end of 2.5 years
 - Goal: 80% of students will submit their approved thesis by the end of 3 years
 - Goal: 95% of students will submit their approved thesis by the end of 3.5 years
 - Successful completion of an oral defense
 - Goal: 95% of students will successfully defend their thesis
 - Successful completion of an oral exam
 - Goal: 95% of students will successfully pass their oral exams
 - Submission of a manuscript to a peer-reviewed journal
 - Goal: 50% by the completion of the degree
3. Produce and defend a creative and scholarly piece of work
 - Successful completion of a written research proposal
 - Goal: 80% of students will submit their approved thesis proposal by the end of their second semester
 - Goal: 100% of students will submit their approved thesis proposal by the end of their third semester

- Successful completion of a written thesis
 - Goal: 60% of students will submit their approved thesis by the end of 2.5 years
 - Goal: 80% of students will submit their approved thesis by the end of 3 years
 - Goal: 95% of students will submit their approved thesis by the end of 3.5 years
- Successful completion of an oral defense
 - Goal: 95% of students will successfully defend their thesis
- Submission of a manuscript to a peer-reviewed journal
 - Goal: 50% by the completion of the degree

*Applicable only to Field/Laboratory Thesis option.