

# Graduate Student Handbook

Central Washington University  
Department of Biological Sciences  
2009-2010



**Department of Biological Sciences Graduate Students,  
Fall 2009**

**Front Row: James Meidell, Paul Duke, Kori Ault**

**Middle Row: Dale Jansons, Stefanie Buxel, Jen Lannoye, Jack Lester, Melissa Reitz, Amber Palmeri-Miles, Adam Hannuksela, Susan Brady, Luke Peterson, Miao Giao, Wenbin Mei**

**Back Row: James Pense, Eric Foss, Antonia DeRosa**

**Not Pictured: Jamie Lamperth, Michelle Lester, Evan Neumann, Patrick Emblidge, Shawn Corrigan, April Barreca, Tom Elliott, Brandon Fessler, Allison Johnson, Aja Woodrow, Andrew Puls**

## **Introduction**

Welcome to graduate school! You are embarking on one of the most exciting times of your career. Unlike undergraduate study where you had less freedom to determine your curriculum, in graduate school you design most of your own course of study and research. You will learn to become an authentic scientist – how to conduct science and how to disseminate your work. You will make the transition from someone who reads about science to one who does science.

Graduate school is fun and exciting; it can also be stressful and difficult. We have compiled this handbook to help make your progress smooth and less stressful. Below you'll find some “nuts-and-bolts” information to guide you through the hurdles of graduate school, and some advice that comes from our experience as former graduate students and current graduate advisors. This guide is not intended to be comprehensive, but rather to complement the guidelines set forth by the graduate office. You should consult the graduate catalog for additional details about graduate school at CWU.

## **Why Pursue a Masters Degree?**

While many universities discourage students from seeking a master's degree, and prefer them to concentrate their efforts on pursuit of a Ph.D., CWU has developed a strong program at the master's level. Why do we believe so strongly in master's degrees? A master's program can provide training and expertise for those needing a terminal degree for entry-level positions in government, industry, and education. It serves other students by preparing them for the Ph.D. degree. Obtaining a master's degree before a Ph.D. broadens your perspective by diversifying your exposure to new ideas, provides experience in research and writing, and provides what is likely your first opportunity to publish a paper.

## **Timeline**

You are expected to complete your master's degree within two years. The timetable outlined below suggests steps to take each quarter in order to complete your program in a timely manner. This is followed by a schedule of important milestones and their deadlines.

### First Year

Fall – establish your committee; design an approved course of study (list of courses you will take); develop thesis research proposal  
Winter – submit thesis research proposal  
Spring – data collection  
Summer – data collection; preliminary analyses

### Second Year

Fall – finish data collection; data analysis  
Winter – specialty exam; complete data analysis; begin writing thesis  
Spring – finish writing thesis; prepare for oral defense

## Important Milestones:

Part of a successful graduate school experience is learning to submit the right forms at the right time. Keep in mind that the responsibility for meeting these deadlines is yours. You are responsible for arranging all meetings with your advisor and committee members.

Form	Deadline	Requirements
<b>Course of Study Form</b>	End of 1 <sup>st</sup> quarter	Requires meeting with your advisor to form a committee that will review your transcripts and test scores to identify weaknesses and choose appropriate coursework. IMPORTANT: failure to meet this deadline may result in dismissal from the program.
<b>Graduate Committee and Option Approval Form</b>	End of 2 <sup>nd</sup> quarter	Requires meeting with your committee and deciding upon a topic and title of your proposed thesis research project.
<b>Research Proposal</b>	End of 2 <sup>nd</sup> quarter	Written thesis research proposal must be presented to your committee.
<b>Specialty Exam (oral)</b>	Quarter prior to graduation date	Exam will cover topics in your area of study and will be administered by the graduate committee and other interested faculty.
<b>Application for Final Examination</b>	3 wks prior to final exam during quarter of graduation	This form must be completed and filed in the Graduate Office. The exam is essentially a defense of your thesis research. A public seminar presentation is required, followed by an oral exam administered by the committee.
<b>Application for Graduation</b>	Beginning of final quarter	This form must be filed in the Graduate Office.

## COMMITTEE

One of the first items of business is to select your committee. This consists of a committee chair (your advisor or major professor) and at least two other faculty members. The committee helps you design a course of study, provides feedback on your thesis research design, administers the specialty written and final oral exams, and provides guidance on and approves your thesis.

You and your advisor should work together to select a committee. Choose committee members whose expertise complements one another. Breadth is important for maximizing feedback on your research. Perhaps more importantly, pick faculty who you feel will care about your interests, who will be interested in your work. Your committee is integral to your success in graduate school; it is very important that you feel comfortable with each member to seek advice. Biology Department faculty and their research interests are listed below. Be canny about your committee. Keep them informed of what you are doing; keep them aware of your presence. But don't bug them. Be an interesting presence, not a pest. Anticipate personality problems. If you

find that you don't get along with your major professor or other committee members, get them changed – early on.

## **BIOLOGY FACULTY MEMBERS**

Make a concerted effort during your first quarter to get to know the faculty, keeping in mind their suitability as potential committee members. Stop by and chat about research and teaching interests. Ask them for reprints of their research, and about important books and papers that have influenced them. Faculty members from other departments and adjunct faculty may also serve on committees (but not as committee chairs) if they are members of the graduate faculty.

**Clay Arango**, Research Associate and Lecturer

Ph.D. University of Notre Dame, 2007

*Research Interests:* stream ecology; how humans modify the uptake and transformation of nutrients in stream ecosystems.

**Daniel D. Beck**, Professor

Ph.D. University of Arizona (Ecology & Evolutionary Biology), 1991.

*Research Interests:* terrestrial ecology, physiological ecology, behavior, reptile ecology, conservation biology

**Lucy A. Bottcher**, Adjunct Professor and Senior Lecturer

Ph.D. University of Northern Arizona, 1996

*Research Interests:* behavioral ecology, tropical biology; feeding behavior, performance and ecology in anurans.

**Lucinda Carnell**, Assistant Professor

Ph.D. University of California, Berkeley (Molecular and Cell Biology), 1994

*Research Interests:* regulation of behavior in the nematode, *C. elegans*

**Tom R. Cottrell**, Associate Professor

Ph.D. Colorado State University (Botany), 1993

*Research Interests:* plant ecology in areas of fire disturbance, rare plant habitats; wetland and riparian plant ecology, rare plant habitats

**David M. Darda**, Professor

Ph.D. University of California, Berkeley (Zoology), 1988.

*Research Interests:* evolutionary vertebrate morphology, herpetology, and systematics; distribution and natural history of amphibians and reptiles of the Pacific Northwest

**Raymon A. Donahue**, Adjunct Professor and Lecturer

Ph.D. University of Wyoming (Botany), 1991

*Research Interests:* plant ecophysiology

**Blaise Dondji**, Assistant Professor

Ph.D. University of Jos, Nigeria (Immunology, Parasitological), 1999

*Research Interests:* immunology of infectious diseases

**Kristina A. Ernest**, Professor

Ph.D. University of New Mexico (Biology), 1993.

*Research Interests:* population and community ecology, herbivory, mammals, and tropical biology. Current research focuses on pikas (*Ochotona princeps*)

**Jason Irwin**, Assistant Professor

Ph.D. Miami University, Oxford, Ohio, 2000

*Research Interests:* animal cold tolerance, ecophysiology, amphibians, insects, other invertebrates

**Gabriella Jackson**, Research Associate and Adjunct Professor

Ph.D. University of South Carolina, 2004

*Research Interests:* marine ecology

**Paul W. James**, Professor

Ph.D. Oklahoma State University (Zoology), 1989.

*Research Interests:* fish ecology; spawning behavior and life history strategies of fishes

**James E. Johnson**, Associate Professor

Ph.D. The University of Tennessee (Botany), 1997.

*Research Interests:* Mycology, molecular systematics, molecular ecology and amphibian disease

**Sheldon R. Johnson**, Professor Emeritus

Ph. D. Oregon State University (Zoology), 1971

*Research Interests:* Physiological ecology, with special emphasis in mammalian thermal regulation and energetics

**Holly C. Pinkart**, Associate Professor

Ph.D. University of Tennessee, 1996.

*Research Interests:* microbiology, microbial ecology and physiology

**Mary E. Poulson**, Associate Professor

Ph.D. University of Illinois, 1995

*Research Interests:* plant physiology, plant responses to the environment, stress physiology, forest biology, effects of ultraviolet-B radiation on plant stress tolerance, photosynthesis

**Ian Quitadamo**, Associate Professor

Ph.D. Washington State University, 2002.

*Research Interests:* Neuro-cognitive basis of critical thinking, science learning/performance assessment, cancer biology/tumor angiogenesis, endothelial cell function

**Linda A. Raubeson**, Professor

Ph.D. Yale University (Biology), 1991.

*Research Interests:* phylogeny of pteridophytes and gymnosperms, especially conifers; chloroplast DNA evolution and use of structural mutations in phylogeny reconstruction

**Daniel J. Selski**, Assistant Professor

Ph.D. University of Rochester (New York) (Neurobiology and Anatomy) 1995

*Research Interests:* Development of the Vertebrate Nervous System; specifically the molecular and intercellular mechanisms that growing axons use to recognize the appropriate target neurons and establish synaptic connections. The chick visual system is used as a model.

**Gabrielle Stryker**, Assistant Professor

Ph.D. Johns Hopkins University 1995

*Research Interests:* immunology, parasitology, vaccine development for the protozoan parasite *Trypanosoma cruzi*

**Lixing Sun**, Professor

Ph.D. SUNY/Syracuse (Biology), 1996.

*Research Interests:* ecology and evolution of animal behavior (especially communication systems); chemical ecology.

**R. Steven Wagner**, Associate Professor

Ph.D. Oregon State University (Genetics), 2000.

*Research Interests:* conservation genetics, molecular evolution, herpetology, conservation biology, phylogeography

## **Professional Behavior**

Psychological issues, not intellectual deficiencies, are the most common stumbling block in graduate school. Keep yourself engaged, motivated and on-task. Take advantage of this opportunity to develop colleagues – your fellow graduate students, faculty, and professional biologists in your area of interest. They will help keep you excited about scientific research. Schedule regular meetings with your advisor and keep her/him up to date with your progress, concerns, and any difficulties you are having. Keep in mind that your advisor (and the rest of your committee) is here to help you. They want to see you succeed almost as much as you do. If you are having problems, let your advisor know early on; he/she will appreciate your candor and may likely have some good suggestions for helping solve your difficulties.

To gain the respect of your committee, act professionally in the scheduling of and participation in committee meetings. Always follow through on commitments, however small, that you make with your committee members and other colleagues. Never underestimate how difficult it can be to get three or four busy people together at one time for over one hour. Anticipate difficulty in scheduling people for meetings and plan ahead! Set meetings up in advance, giving each committee member sufficient notice so you can find a mutually agreeable time. Reserve a room. Shortly before the meeting, remind each member of the time, date, and room of the meeting. Committee meetings are for you. Know ahead of time exactly what you want to get out of the

meeting and get feedback from your advisor. Write an agenda, and lead the meeting. Take notes on decisions and recommendations made during each meeting.

All graduate students are expected to attend department-sponsored seminars and defense seminars of other graduate students. Be sure to check the schedule for the Natural Science Seminar Series each quarter and plan to attend these.

## **Coursework**

As you plan your course of study, be sure to refer to the following general policy on required and allowable credits. Keep in mind that, in addition to courses offered in the Biology Department, other departments and programs on campus (e.g., Geography, Geology, Psychology, Resource Management, Anthropology, Chemistry) may offer courses relevant to your study.

45 credits beyond the B.S./B.A. degree are required for the M.S. Required courses include:

- BIOL 501 -- Research Methods and Techniques, 4 credits
- BIOL 502 -- Research Proposal Presentations, 2 credits
- BIOL 505 -- Current Topics in Biology, 6 credits (2 credits each; take 3 times)
- BIOL 595 -- Graduate Research, 10 credits. (A maximum of 10 can be counted toward the 45 credits required; you can take more as your advisor/committee approves, but only 10 will count on the course of study form).
- BIOL 602 -- Research Presentations, 2 credits
- BIOL 700 -- Master's Thesis, 6 credits
- Electives selected by advisement, 15 credits

In addition, please note:

- Any courses below the 400 level that you take (either by choice or required by the committee) cannot be counted toward the required 45 credits.
- No more than 9 graduate credits can be transferred from another school.
- Students with assistantships must take at least 10 credits each quarter to keep an assistantship (BIOL 595 credits can be used to keep credits at 10/quarter).
- You must be enrolled for at least 2 credits during the quarter in which you graduate.
- Credit toward the graduate degree will not be accepted for courses in which a grade lower than C is earned.
- Grades for all courses included on the Course of Study must average at least a 3.0, where the cumulative grade point average is calculated on all courses taken after admittance into a graduate program, whether part or the approved Course of Study or not. A graduate student whose cumulative grade point average falls below 3.0 at the end of any quarter will be placed on academic probation for the next academic quarter. While on probation, a student may not hold a graduate assistantship. If the cumulative grade point average remains below 3.0 after a second consecutive quarter, the student will no longer be eligible to continue in the Master's program.

## **Master's Research Proposal**

A major part of graduate school is to conceive, design, implement, and summarize in written form original, independent research. Your proposal is the first step in this process. Focusing on

an exciting research question is the primary goal of your first quarter, so plan your time accordingly. Realize that your research will shape you as a scientist; therefore, it is absolutely essential that you choose a topic in which you are very interested. The stronger your interest and passion for your research topic, the easier it will be to press forward through any difficulties which may arise.

When preparing to write your proposal, discuss your ideas with other graduate students. Ask them if you can look at their proposals. Critical elements to include in a research proposal include:

- 1) what you propose to do,
- 2) why it is important,
- 3) how it fits into the broad scheme of knowledge,
- 4) a literature review that substantiates #3,
- 5) a clear statement of your questions/hypotheses
- 6) description of a) experiments or observations and b) statistical analyses you'll conduct that will permit you to test your hypotheses
- 7) potential pitfalls and what you'll do if things go awry,
- 8) a timeline of anticipated completion

Get feedback from your colleagues (e.g., other graduate students) about your proposal before giving it to your advisor.

### **Master's Research**

Plan a schedule and stay on track. You are engaging in an exciting, creative endeavor of your own design—make it fun. Consult frequently with your major professor during this stage; encourage him or her to accompany you into the field or laboratory. Keep reading the literature as much as you can during this stage; it will help keep you excited and motivated. Go to regional meetings; present your preliminary data if possible. Posters are great—good for showing early results and less stressful than oral presentations.

As you carry out your research, it is essential to keep good records of your data. Keep a detailed lab or field notebook, recording all of your methods and results as well as your objectives and interpretations. Don't run the risk of losing data: make photocopies of your notes periodically, and store these in a separate location from your notebook. There are horror stories of students having all their notes in a backpack that got stolen (from an office, from a vehicle, etc.) – and having to start from scratch. The same goes for computer files – keep backup documents in separate locations (e.g., pin drives, network server).

**Special Note:** No human or animal research of any kind may be conducted without obtaining prior approval from the relevant department and university review committees. In the case of research with human subjects, the review is conducted by the Institutional Review Board (IRB). Animal research is subject to regulation by the University Animal Care and Use Committee (IACUC).

## **Oral Exam**

The oral exam, administered by your graduate committee, is usually taken during your 4<sup>th</sup> or 5<sup>th</sup> quarter. Its purpose is to assess your grasp of topics in your area of study, and your understanding of how your specialty fits into a larger biological context. Specifics of the oral exam may vary from committee to committee, and different faculty members may stress different points (e.g., one may be interested in your understanding of the historical underpinnings of your specialty, while another may want to see how well you can “think on your feet”). In any case, remember that your committee is on your side during the oral exam – they truly want you to succeed. Talk to them well ahead of time about how you might prepare.

## **Writing the Thesis**

This stage of your degree can be just as exciting as planning your research and collecting the data. It is a time for more intensive reading, organizing your thoughts, and putting your study into the context of what is known about your specialty area. As you enter this phase, never underestimate how much time it takes to write well! A typical thesis goes through 4 to 6 drafts from start to finish; a published paper, several more.

Follow these steps:

- Make an outline of key points and follow it carefully.
- Make your figures and tables and write your thesis around them.
- Read “The Elements of Style” by E.B. White before you begin writing and consult it frequently as you write your thesis. Follow the Council of Biology Editors (CBE) style manual and, in consultation with your advisor, pick a format for your thesis. Write with economy, clarity, and precision: clear writing leads to clear thinking.
- Write the introduction and conclusions last.
- Be sure to refer to the Graduate School’s guidelines for the thesis. They have very exacting expectations of what the final copy of your thesis should look like. Do not take them lightly! Consult with the Graduate Office early in writing your thesis and review their guidelines frequently as you write. Attend the thesis writing workshop offered by the Graduate Office. This will make your life much easier as you enter the final stretch between your defense and getting that final copy approved by the Graduate Office.

## **Getting Ready to Graduate**

All students must report to the Graduate Office for a final evaluation no later than the first week of the student’s final quarter. At this evaluation, candidacy requirements, grade point average, and Course of Study completion are processed. Students must be registered for a minimum of two (2) credits at the university during the quarter in which the degree is to be conferred. Enrollment for this purpose should be completed during the usual pre-registration or regular registration periods to insure degree conferral. A student who has been approved for the degree list for a particular quarter and does not complete the requirements for degree conferral by the published deadline (two weeks prior to the last day of finals), but who does complete all the requirements by the last day of the quarter, will receive the degree the following quarter without further registration.

## **Thesis Defense**

Plan Ahead! Remember that the Application for Final Examination is due three weeks prior to final exam during the quarter of graduation (this form must be completed by you and your committee members and filed in the Graduate Office). Prepare your figures and tables ahead of time. Give your committee members 10-14 days to review drafts of your thesis. How long it takes for them to return it, and the quality of their comments, depends greatly on how well written your thesis is to begin with. Plan to present your oral defense seminar about 10 days (at the earliest) after you get comments back from your committee. This, of course, depends on how many changes are needed. This means that your committee should get your “penultimate” thesis draft about 3 weeks before your defense. You should give your committee a “final” copy of your thesis, with their earlier comments incorporated, 3 – 4 days before your defense. Practice, practice, practice! As a general rule, give five (yes, 5!) practice presentations before your final defense. It can be helpful to invite your colleagues (fellow graduate students) to your practice sessions and ask them for constructive feedback.

Logistics: In advance, reserve a room for your defense (ask the department secretary for assistance). Please prepare (or ask the department secretary to prepare) an announcement for your defense, and post it around the department and Science Building about 5-7 days before your defense. Invite your friends and family!

## **Publishing the Thesis**

Publishing a paper is not as brutal as many think. It can actually be fun! This accomplishment is VERY important if you want a good job. And it is considered one of the responsibilities of being a scientist – it makes your research more worth-while. Because your degree is indirectly (and perhaps directly) subsidized by the public, you should make your findings available to the public and to other scientists. The thesis alone (considered an unpublished document) does not reach a broad audience, and may be very difficult for many people to access. A publication in a journal receives wider attention and is more readily accessible. Work with your committee chair to discuss possible journals for submitting your thesis research for publication. Discuss authorship early on, and revisit as needed.

## **Graduate Assistantships**

Assistantships take two forms: research assistantships and teaching assistantships. Research assistantships are generally grant-funded positions requiring graduate students to work on a project funded through a grant. Teaching Assistantships (TAs) are a more common means by which graduate students keep themselves afloat financially. While your main purpose in graduate school is to gain experience in research, your acceptance of a TA requires that you become a competent and responsible teacher as well. Some graduate students will relish this opportunity, as they have chosen teaching as their career goal. But even for those who do not foresee teaching in the future, being a TA can be very rewarding. Helping undergraduate students learn more about biology and inspiring them to become scientifically literate is rewarding in itself. In addition, in preparing for teaching you will review much of basic biology and undoubtedly learn quite a bit more biology than you imagined.

Some of your responsibilities as a TA include:

- being available to the instructor from the beginning of the quarter through final exams
- attending TA meetings throughout the quarter
- asking the instructor what your responsibilities are for the course you are TA'ing
- having a thorough understanding of the material students are expected to learn in the course
- posting your name and office hours on your office door. Keep your office hours (or post a note in the rare instances when you cannot be there).
- promptly grading and returning assignments to students
- keeping accurate records of student grades (check with your instructor)
- treating students in a professional and courteous manner

The Office of Graduate Studies and the Department of Biological Sciences periodically hold workshops specifically for teaching assistants (usually in the fall). Be sure that you stay informed as to when these workshops are offered and that you attend them as required.

## **Research and Equipment Grants**

There are several grants that graduate students can apply for at CWU:

- Master's research or creative activity fellowship
- Graduate student summer research fellowship
- Graduate student travel grants

Look for information, including deadlines, posted on the Graduate Studies website: (<http://www.cwu.edu/~masters/forms/formsResearch.html>). If appropriate, you will need approval from the Animal Care and Use committee and/or the Human Subjects Committee to submit along with your proposals. Note that it may take these committees two or three weeks to approve your proposal. Your committee chair will also need some time, likely at least two weeks, to read the proposal before it is submitted. If you are awarded a fellowship or grant, you must acknowledge this support on posters, presentations, and publications that result from your research. Also, you must submit a final report to the Graduate Students office that summarizes the work you did. Failure to submit final reports may disqualify you from additional funding.

Many funding sources outside the university are also available. Check with your committee members, and do some on-line searching. Professional societies (e.g. Amer. Soc. Microbiol., NW Science Association) are good places to check.

## **Campus Resources**

### **Biology Department**

Office: Science 338

Website: <http://www.cwu.edu/~biology/grad/>

Staff:

Department Chair: Paul James

Secretary Lead: Kari Linnell

Graduate Committee Chair: Lixing Sun

Stockroom: Mary Bottcher

Technical assistance: Jonathan Betz

**Graduate Studies and Research** – A wealth of information and guidance, including potential funding sources.

Office: Barge 305

Website: <http://www.cwu.edu/~masters/>

### **Interactions**

In our focus on the biology department, we sometimes forget that there are other excellent departments on this campus with some very fine faculty and students. Take every opportunity to interact with them. Attend the Natural Science Seminars and seminars in Geology, Geography, Physics, Psychology, Chemistry, Anthropology and other departments. Take a GIS or Anthropology course. Go on a Geology fieldtrip. One of the benefits of a university the size of CWU is that it is easy to develop interactions with other departments in the sciences. Such interactions can broaden your perspective and make you a better scientist.