

L I C H

Laboratory of Integrative and Comparative Herpetology

Information for Prospective Students

Thank you for your interest in the **Laboratory of Integrative and Comparative Herpetology** (LICH). As our name implies, we conduct research primarily (but not exclusively) on the biology of amphibians and reptiles. The nature of these studies is diverse (see **Research**), ranging from anatomy and physiology, to behavior and ecology. All of our studies also have an underlying evolutionary component and most integrate two or more of the aforementioned fields (e.g., behavioral ecology, ecological physiology, etc.).

I enjoy working with bright, motivated students (both graduate and undergraduate) who share my interests in integrative and comparative biology and herpetology. I have individualized expectations for undergraduates and graduates working in my lab, and try to help both identify experiences or research projects that help them to achieve their personal and professional goals.

Undergraduate Students (Independent Study, Volunteers, & Others)

Undergraduates under my supervision have worked on a number of projects ranging from literature research, to museology, to collaborative or semi-independent research projects (see **Undergraduates of LICH**). The type of experience you will receive will depend on a number of factors including (1) your immediate or professional goals (e.g., a letter of recommendation for a professional school, research experience for graduate school, etc.), (2) your previous experience, (3) the amount of time you are willing to commit to the experience, and (4) the flexibility of your schedule.

In most cases new students are introduced to research in LICH by working with one or more graduate students as research assistants or as a curatorial assistant for the CSUN Herpetology Collection. In this way I can identify your strengths and determine your level of commitment prior to assigning you an independent research project. Regardless of experience, students are encouraged to sign up for 3 units of Independent Study (BIOL 496). Each unit amounts to 3 hours/week or 45 hours/semester

(accordingly, 3 units = 135 hours). In most cases, I will help you create a schedule that works around your other responsibilities (coursework, employment, etc.). Many students have completed part or even all of their Independent Study hours during academic breaks (winter, spring, summer) and then applied the hours to the following semester. This flexibility permits even the busiest students to acquire research experience.

Local K-12 science and biology teachers and other members of the community who share our research interests have also been involved in research in LICH. If you would like to volunteer to work in LICH, please contact me so we can discuss your interests.

Normally, there are no more than 3–5 undergraduates working in the lab. Taking on more students than that makes it difficult for me to find meaningful projects for each student to be actively engaged in and for me to supervise them. Consequently, there are typically only 1–3 openings in the lab for new undergraduates each semester. In most cases the students who are chosen to work in the lab have taken one of my courses (see [Teaching](#)), which gives me the opportunity to learn about their goals and their work ethic. However, any student who has a passion for comparative biology, a positive can-do attitude, an ability to work well with others, and who is both reliable and responsible will be considered.

If you are interested in acquiring Independent Study or in volunteering for LICH, please send me an email (robert.e.espinoza@csun.edu) or call (818-677-4980) to make an appointment to visit our lab (Chaparral Hall 5328) and discuss your interests and the types of opportunities available in LICH.

Graduate Students (MS)

Your graduate training will shape the kind of biologist you are likely to become as you enter the work force. Consequently, choosing the right university, graduate program, advisor, and research project is critically important. To help guide your decision, I provide a list of benefits as well as my frank expectations for graduate students working in LICH.

Foremost, a note on personal commitment: completing a Masters degree in biology requires a major commitment of time and effort. This is not a degree that can be completed in 2–3 years if your commitment is only part time, and it certainly cannot be completed in your “spare time.” Frequently, thesis obligations will require more than a full-time commitment (i.e.,

beyond the typical 8–5 workday) and will regularly include long hours on weekends and holidays.

Generally, graduate students in LICH can expect (1) a vibrant, interactive, and friendly laboratory environment; (2) to work relatively independently on his/her own research project; (3) to learn about many aspects of comparative biology outside of his/her own research area by regularly attending reading groups, lab meetings, and professional conferences; (4) to gain experience with all aspects of professional development: grant-writing skills, curriculum vitae preparation, oral and poster presentations of data, publishing research, and graduate school or job interview skills, research ethics; and (5) to gain research and (usually) teaching experiences that will prepare him/her ultimately for careers in academia, industry, government, or non-profit organizations. I am especially interested in mentoring students who are planning or interested in pursuing a Ph.D. following their undergraduate or MS degree. I have less experience training students who are interested in careers in the allied health fields (e.g., veterinary, dental, medical professionals).

LICH is a dynamic and interactive place. You can expect to interact with me and with other students regularly and especially during our weekly lab meetings. In these meetings we will evaluate your progress and ability to accomplish self-imposed goals, review current literature, help each other develop project ideas or overcome analytical and statistical obstacles, and critically review each others' presentations, grant proposals, theses, and manuscripts.

Once I know what you hope to gain from your graduate experience at CSU Northridge, and in LICH specifically (e.g., entrance into a Ph.D. program or professional school, teaching position at a community college, career in the US Fish and Wildlife Service, etc.), I will do my best to help you meet those goals.

General Expectations for Graduate Students

Training to be a professional biologist is an exciting endeavor, but in many areas of our profession jobs are few and the competition for those positions is keen. To be successful, you need to be either extremely intelligent or a very hard worker. I do not expect you to be a genius, but I will expect you to be conscientious, persistent when confronted with challenges (both professional and personal), and willing to learn and get work done in a timely manner. Naturally, intelligence alone does not suffice. Albert Einstein

once said, "Science is 1% inspiration and 99% perspiration." New students often equate working hard with working long hours, but performance is better measured in productivity, not in time spent in the library, lab, or field. I will expect you to finish your MS degree in 2–3 years. *To accomplish this will often require working more than a typical 8–5 workday or five-day workweek.* I generally do not accept part time graduate students. Accordingly, I expect my MS students to focus their attention and time primarily on their thesis research. Of course there will be times when other responsibilities will interfere with or take priority over achieving that goal, but generally coursework, outside jobs, etc. should be secondary to working on your thesis. I communicate regularly with my graduate students (in lab and one-on-one meetings) about my perceptions of their progress so they are clear about my expectations.

I expect graduate students to develop into independent scientists who can read and think critically, respond creatively to novel challenges, and complete the projects that they start. Consequently, my advising philosophy for graduate students is to act primarily as a facilitator, giving guidance rather than solving research problems. To do the latter would not prepare my students for the independent thinking and investigating expected of them in the real world. For example, I help my students develop a thesis that is biologically compelling and is of mutual interest, but I do not hand them an entirely defined project. I provide my students with (or help them acquire) the tools (both intellectual and material) that they need to initiate their investigation, but I do not conduct the research for them. You will be allowed to make your own mistakes, which are invaluable learning experiences. Yet because I expect my students to complete their MS within a relatively short timeframe, I try to prevent them from straying into research cul de sacs.

I give my MS students considerable latitude in developing their thesis question(s) and approach (within the bounds of my broader research interests and expertise). Students need not work on projects directly related to my current studies or those that complement other LICH graduates (past or present). I strongly encourage new students to select a thesis project that is intellectually stimulating and exciting to them. As a MS student, you will spend many long hours reading, conducting research, and experiencing the inevitable set backs that all investigators face. When confronted with such challenges, anything less than an engrossing project will quickly lose your interest. Likewise, your thesis must be an original and significant contribution to science, but it need not solve the world's biological problems! It may, however, serve as a launching point for your career or for

advanced education, should you choose to pursue a Ph.D. We will work together (and with your graduate committee) to ensure that your project is scientifically sound, yet doable within the timeframe expected for MS students. Ultimately, I expect my students to become masters of all aspects of their projects (e.g., relevant literature, methodology, including statistical analyses, and broader implications). In several cases my students have developed skills or expertise that I do not possess via advanced independent study, coursework, or through collaborations with professionals within or outside of CSU Northridge.

CSUN's MS program in biology is a research-oriented degree. Very few courses are required, but 31 units must be accumulated (with no less than a "B" in each course used in the formal program) to qualify for MS candidacy. MS students are also required to give an oral presentation of their proposed thesis research before the end of their second semester in the program. This gives the faculty and other graduate students an opportunity to provide critical input at an early stage of thesis development or execution. Upon completion of their study, students give an oral public defense of all elements of their MS research. Students completing the program graduate with an MS in Biology, although their specific investigation will have been in a more precisely defined field of study.

Selection Criteria for Graduate Students

I am looking for individuals who (1) are enthusiastic and have the burning desire to conduct original research; (2) are friendly, mutually supportive, and can work in a collaborative environment, sometimes giving of their time for the benefit of the lab or their lab mates; (3) are highly motivated with a positive, can-do attitude toward learning and problem solving—even in the face of set backs; (4) will actively pursue intra- and extramural funding for their research projects; (5) will participate in related professional activities (e.g., attending and presenting their research at professional meetings, attending local seminars, participating in local reading groups, etc.); and (6) are willing to put in the time to see a project to completion. In short, I seek to populate LICH with individuals who are intellectually curious, motivated to grow professionally, and are fun to be around.

I find that enthusiasm, motivation, and past research experience or a profound interest in conducting research are better predictors of success in our graduate program than are GPA or GRE scores; however, students must meet minimum standards to be accepted into our program. Another important factor is "fit" or how well your interests match or complement

mine as well as other members of LICH. We do integrative and comparative herpetology. Students interested in joining LICH should have research interests that fall within this scope (see [Research](#)). The most competitive applicants will be those who have completed research projects that are similar or complement those of other LICH researchers. It is also important to me that everyone in LICH respects one another and contributes to a positive lab atmosphere. To that end, I insist that applicants visit LICH for a one-on-one interview with me and the other members of the lab. Likewise, I usually contact personal references to ensure your personality matches as well.

How to Apply to Conduct Research in LICH

The first step is to contact the LICH Director, [Dr. Robert Espinoza](#), preferably by email (robert.e.espinoza@csun.edu) or by calling to make an appointment (818-677-4980). If I am in town, I will usually respond within 24 hours. In this first message/meeting please tell me about yourself, in what ways your interests fit with those of LICH generally, and what you would like to accomplish (e.g., 3 units of independent study credit, a summer research experience, field or lab experience, a MS degree, etc.). Please include a list of relevant courses and grades, overall GPA, and GRE scores if available (for those pursuing a graduate student position). Although I do not weigh GPA or GRE scores heavily in my decision for acceptance, I find these are useful indicators of aptitude or deficit, and they also determine your eligibility for fellowships and teaching assistantships (MS applicants). Finally, tell me about your research or related experiences. If you seem to be qualified and a good fit, I will then ask you to visit LICH for an interview or for contact information for your professional references.

For more details on applying for admission to the MS program in Biology at CSU Northridge, see <http://www.csun.edu/biology/grad/>. Note that the due dates for applications to the MS program are **15 October** (for spring admission) and **15 March** (for fall admission). **I usually make my decisions regarding whom I will accept into the lab several months before these dates, so plan accordingly.** Once the lab is full (maximum of four graduate students and a similar number of undergraduates), there simply will not be room for more students, so contact me as early as possible.

If you have questions about the application process, please email the Graduate Coordinator for Biology, [Dr. Tim Karels](#) (karels@csun.edu).

Additional information on the faculty and resources of the Department of Biology is available at <http://www.csun.edu/biology/>. For information about CSUN's Ecology and Evolution Program, please visit: <http://www.csun.edu/biology/ecology.htm>.

Funding

Most graduate students in the **Department of Biology** are funded by graduate assistantships or teaching associateships (GA or TA, respectively). GAs assist the professor teaching a particular course by preparing course materials, setting up labs and practicals, helping out on fieldtrips, grading homework or exams, etc. TAs typically teach introductory biology laboratories (majors and non-majors introductory biology, anatomy, physiology, microbiology, etc.). Depending on your academic background and record and related experience, you may be eligible for a GA, TA, or both. Alternatively, some of our MS students are supported by a research assistantship (RA), which is funded externally, usually from a grant received by their major professor. Some of our students also work outside of the university. Most of our graduate students teach two introductory labs a week and serve as GA for another course to make ends meet. Nevertheless, the compensation provided by the institution is relatively low (~\$1100/month), especially in light of the cost of living in southern California. Funding is provided only for the nine months of the school year. A limited number of GA- and TA-ships are available over the summer in the Department of Biology, so most graduate students seek employment over the summer. Recent negotiations between the union representing CSU graduate students (United Auto Workers) and the CSU have resulted in a substantial raise. Additional negotiations still on the horizon suggest continued improvement of working conditions for graduate students (e.g., tuition waivers, health insurance, etc.).

The graduate student members of LICH (past and present) have been supported by a combination of graduate and teaching assistantships, competitive fellowships, and other awards. All my graduate students have also received external funding to support their thesis research, which is an essential element of becoming a successful researcher. In fact, I am very proud of the funding record my students have achieved, with >\$150,000 awarded since 2002. This funding comes from both intramural (from CSUN) and various extramural sources (typically professional societies to which they belong; see **Funding Sources**). Accordingly, new graduate students are expected to vigorously pursue intra- and extramural funding to support their research. The level of funding that I can provide for a

student's research project will depend on the nature of his/her study. Students working on a question that is related to one of my funded projects may have access to funding not available to those working on studies not directly supported by my grants.

The Region, Campus, & Department

California State University, Northridge (CSUN: <http://www.csun.edu/>) lies within the **San Fernando Valley** (<http://www.valleyofthestars.org/>). With an area larger than Boston, San Francisco, and Washington D.C. combined, the San Fernando Valley is the fastest growing part of Los Angeles County with a population exceeding 1.7 million. Topographically, we reside in an exceptionally diverse area: the Valley is surrounded by five mountain ranges and is less than a half-hour drive from sandy and rocky beaches along the Pacific Ocean and two hours from the Mojave Desert. Visitors are often surprised by the abundance and diversity of fine restaurants, proximity to popular **attractions** (<http://www.latourist.com/index.php?page=tourist-attractions-links>), and wilderness areas in the region. The topographic diversity is exceeded only by our biological diversity. From the ocean to the deserts this region of southern California is considered a biodiversity hotspot for its species richness and the large number of endemic taxa. The climate is mild in winter and hot in the summer. Collectively, these local attributes greatly facilitate studies of the more than 100 species of amphibians and reptiles living within a 100-mile radius. The communities surrounding CSUN offer many opportunities for student housing (apartments, condominiums, and houses). On average, you should expect to pay \$400–800 to have a room in a shared apartment or house, to at least ~\$900/month if you wish to live alone. The University's **Village Apartments** (<http://housing.csun.edu/village.php>) offer affordable student housing (~\$750 for a 1 bedroom) for couples and families, but there is often a semester-long wait, so contact them early if you are interested.

CSUN is the 25th largest university in the United States (enrollment ~35,000 in 2010) and was recently ranked **first** among all comprehensive universities (N = 529) in producing undergraduate students in science, mathematics, and engineering who go on to complete the Ph.D. CSUN has been designated as a Hispanic-serving institute and offers many programs aimed at increasing minority participation in research.

The graduate program in the **Department of Biology** is the largest in the **College of Science and Mathematics** with an average of ~100 graduate

students enrolled over the past five years. As such we have exceptionally diverse course offerings and resources available for our students. The Department's **faculty** (http://www.csun.edu/biology/faculty_staff.htm) comprises a diverse group of scientists with expertise in all major areas of biology, but particularly in the areas of organismal biology, ecology, and evolution. Facilities include a well-equipped **DNA Sequencing Facility** (<http://www.csun.edu/~ds10467/>); confocal, scanning, and transmission electron microscopes; gas chromatographs and spectrophotometers; oxygen analyzers; growth chambers; a marine lab with chilled and tropical water systems; darkrooms; computer laboratories; vertebrate, entomological, and herbarium collections; a botanic garden with research space; a fully staffed vivarium for animal housing; and much more.

Resources in LICH

LICH is well equipped for conducting a variety of field and laboratory studies related to ecological and evolutionary physiology and behavioral ecology of amphibians and reptiles. Noteworthy research items include three large growth chambers for experiments requiring precise temperature and light control, small and large computer-controlled thermal gradients for thermoregulatory studies, and three vivarium rooms for experiments requiring the maintenance of large numbers of captive animals. We also have equipment for a variety of cellular, subcellular, and molecular analyses. For advanced molecular analyses, the **DNA Sequencing Facility** (<http://www.csun.edu/~ds10467/>) and other faculty in the department have additional equipment and expertise. We also conduct research with a number of **collaborative investigators** from around the globe, which greatly increases access to LICH members to additional facilities and expertise.