

Nieh lab general research agreement

I. OVERVIEW

The goal of the Nieh lab BISP 199 course is to provide undergraduate students with real-world research experience that focuses on (1) critical thinking and application of the scientific method through the formulation and testing of hypotheses about animal communication, (2) learning how to collect and analyze data, (3) clearly presenting your results through an oral presentation and written paper, and (4) learning through teaching and interacting with other students and lab members.

Our lab is interested in the evolution of animal communication and approaches this question from multiple levels of analysis. Our primary goal is to understand how and why different types of food-location communication systems have evolved in the highly social bees.

On an ultimate level, we are interested in why different types of food-location communication systems have evolved. We examine the advantages and disadvantages of such systems, look at their adaptations to different habitats, try to find evolutionary trends and explanations, and reconstruct phylogenies.

On a proximate level, we are interested in communication mechanisms: acoustic, olfactory, and visual. Some of the most innovative work in the lab focuses on communication mechanisms—including our cyborg bee project. Our approach is to move from field behavioral studies that examine the overall phenomenon of food-location communication to detailed studies of communication mechanisms.

Another important goal is the development of new technologies to solve problems in animal behavior, animal communication, and chemical ecology. We therefore welcome collaborations with many disciplines, including computer science, electrical engineering, and chemistry. We also wish to facilitate technology transfer and training with those countries and labs involved in our research.



II. GENERAL COURSE REQUIREMENTS

A. STUDENT RESPONSIBILITIES

Through your research in the lab, you will be given the opportunity to fully engage in the scientific process. I am committed to helping you succeed in this endeavor, but in order for you to succeed, you need to commit to the following:

1. Time commitment: 12 hours per week (minimum). Animals usually do not behave on demand, and thus you may find yourself extremely busy when experiments are working well. To work most efficiently, you should take advantage of such times to obtain as much data as possible. Keep in mind that although it works today, it may not work tomorrow!

2. Lab meetings: (one meeting each two weeks). Attendance at lab meetings is required.

3. Readings: Based upon your individual project, you will be given a reading list. Some readings may be discussed at a lab meeting, but an understanding of all required readings will be necessary for the final paper. All readings will be available online on the Nieh e-lab. During the course, you will also be required to conduct a literature search and submit two new papers (not previously listed in the BISP 199 readings) for inclusion in our online library. Please email me a brief description of why these papers are relevant and enclose either the pdf files of the papers or place a paper copy in my mailbox.

4. WebCT workshop: During the first week, there will be a WebCT workshop that you are required to attend (if you have not previously used the designer functions of WebCT) in order to learn how to use WebCT, a primary tool of the lab. Throughout the course, you will need to use WebCT. You will be given a WebCT homepage that you will design and maintain. This webpage will contain: (1) your project statement describing the broader significance of your project and the purpose of your project, (2) a project plan that lists the relevant dates on which certain parts of the project will be completed, (3) your final project paper, and (4) a streaming video file of your PowerPoint presentation. **IMPORTANT:** With the exception of (1), all other items on your webpage should be "hidden". They will be available to all lab members, but will not be visible to lab guests. Once the data is published, these hidden items will be released to the general public. Our web address is: <http://webct.ucsd.edu>

5. Laboratory notebook: Learning and practicing good lab notebook habits is an important part of your experience. You will be asked to keep a well-organized lab notebook that documents what you are doing at each step of the project. This is particularly important because a great deal of effort, time, and money is being expended to collect and analyze this data. When in doubt, write it down. These notebooks will remain with the lab and should be sufficiently clear to allow another student working on the project or myself to understand what you have done and what should be done next. *General lab notebook guidelines apply.* All notes should be written in non-erasable ink. All notes and numbers should be

clearly legible. Data or material that is incorrect should be crossed out but left such that the original is still legible. Also, an explanation should be appended to clarify what the error was. At the end of each page, sign on the bottom of the page. **Your notebook should never leave the lab.**

6. Data organization: You will be given a project binder containing a plastic envelope in which you can store all of the summary data CD's and DVD's pertinent to your project. If your project has extensive video data, this will be stored in your own project box. The binder should be logically divided into several sections corresponding to your project. The first section is reserved for your final paper. Subsequent sections should contain relevant papers, figures, tables, processed data (divided as appropriate), and raw data. **Your data binder should never leave the lab.**

7. Computer usage: Computers are used as available. No computers are exclusively used with any given project. Some computers are newer and more powerful than others. Priority on using these more powerful computers is given to students who are conducting extensive video analysis. If someone comes and needs to use your computer, please try to accommodate him or her. If you are having difficulties using the computers, please first ask the students around you. If they cannot help, please consult the binder entitled "Computer Bible". This has a great deal of useful information dealing specifically with our lab. Much of this information is also available online through the WebCT discussion page. If none of these resources solves your problem, please come talk to me.

8. Firewire drives. All of your files will be saved on a firewire drive. Generally, you will share your firewire drive with other projects, but we will try to arrange it so that there is minimal conflict in drive usage. Plug your drive into an available computer and work directly off the drive. Do not save files onto the computer hard drive or onto the desktop. Save everything onto the firewire drive. **Other users may accidentally erase files saved on the computers!** Periodically, all of the files will be erased to clean the computers. **Your firewire drive should never leave the lab.**

9. Data backup: Data backup is essential because *all of your hard work can disappear with a single keystroke*. Save your data onto your firewire drive and burn a CD or DVD copy of all of the analyzed data (Excel, JMP, Videopoint, Illustrator, Word, etc. files) at least once a month (to be stored in your binder). Once a month, use Zipit software to compress all of your analyzed data into file that you upload onto your WebCT folder (example: "Nieh042268.zip" is a backup made on April 22, 1968).

10. Written report: At the end of the quarter, you will submit a brief written report about your research. This report should include a summary of your work, written as a scientific paper (introduction, materials & methods, results, discussion and references), with figures and tables to summarize your work. The written part of the paper (not including figures and tables) should not exceed 5 pages.

11. PowerPoint presentation: At the end of the quarter, you will also give a 15 min PowerPoint presentation of your results. Generally, this should contain no

more than a few data slides and should not contain more than 15 slides. To facilitate discussion, end your PowerPoint presentation with at least two general questions about the broader significance of your work and about the “next step”, where your research should logically take you. Lab members will write a 5 min paragraph answering these questions and summarize what they understood from your talk.

12. Teaching: Because teaching is one of the best ways to learn, you will also share your techniques and reciprocally teach and learn from other students. Your interaction with other lab members will be one of your most important learning experiences.

B. FACULTY RESPONSIBILITIES

I am committed to helping you succeed in the lab. I define success as (1) having completed the requirements of the course, (2) learning the details of your research question, (3) learning how to think critically about your research and that of other students, and (4) extending the results of your research to the next logical step. Not all projects will obtain the results they originally envisioned. This is part of the scientific process. It is important to understand why your results do not match your expectations and to determine how to proceed next.

- 1. Time.** I will work with you on your project for at least 2 hours per week.
- 2. Project planning.** I will help you select a project and monitor the progress of the project on a weekly basis. We will jointly decide upon changes in the project schedule.
- 3. Training.** I will initially train you and then assign a graduate student or experienced lab member to assist in supplemental training in procedures and methods.
- 4. Availability.** I am generally available in my office throughout the week. Please feel free to knock on my door whenever you have any questions. If I am busy, I will schedule a time for us to meet.
- 5. Paper & presentation.** I will carefully and critically review your paper and presentation to ensure that you fully understand the relevant concepts involved and are able to clearly present your project and its results to others.
- 6. Scholarships.** There are several scholarship opportunities for undergraduate research. If you are successful in your work (see above) and you have a genuine interest in continuing, I will help you identify and apply for relevant scholarships and grants.

III. YOUR ROLE IN THE LAB

I believe that it is extremely valuable for your own training—whether in industry, science, and as intellectual development—to avail yourself of all the opportunities for interaction within and outside the lab. We have collaborators in Brazil and in Mexico and they are available through the Nieh e-lab for several levels of interaction ranging from

questions and chats to cooperative work in the field. In the Section of Ecology, Behavior, and Evolution, we have many faculty and student resources for you to pursue your interests and questions. Please take time to meet the other faculty and their students. Learn about their approaches and experiences!

IV. FIELD WORK

When you first enter the lab, your project will largely focus on data analysis in order for you to learn the necessary analysis tools. During this period, you may also be asked to help with experiments. Based upon your initial work and interest, you may be asked to take part in designing and executing experiments after your first quarter. During or after this second quarter, you may want to think about a more independent project, perhaps one that takes you off-campus. There are several funding opportunities available through the university, and I can help you apply for relevant grants.

V. MASTERS WORK AT UCSD

It is possible to obtain a 5th year Masters degree at UCSD by planning ahead. You need to meet certain GPA and coursework requirements, and would spend your 4th year working intensively at research and completing your coursework for graduation. In the 5th year, you will take graduate level courses and complete your research. This can be a great option, especially for students who are not sure about whether they would like to go directly for a PhD.

VI. MY LAB VISION

This section is last, in a position of prominence. The lab has many components, but of all of these, the people are the most important. You can think about our lab as a small enterprise, like a business, whose assets are ideas and people and whose products are education and research—knowledge and papers. Because science cannot occur in isolation, your interactions with other people in the lab are critical to the success of our enterprise. In achieving your own goals of engaging in the scientific method and learning about animal communication, you will be most successful if help others achieve the same goals. Learn to teach and teach to learn. This is why the lab is organized into groups of people who work on similar projects and why teaching is an explicit part of your responsibilities. Take the time to help your lab-mates and allow them to help you. My vision of the ideal lab is of a closely-knit group working towards the common goal of understanding more about animal communication—a lab in which all members share their ideas, knowledge, and efforts. I hope that you will help us achieve this vision.

STUDENT: I have read the research contract and agree to the responsibilities listed in this document.

Signature: _____ Date: _____

P.I. (James Nieh): I have reviewed the research contract with the student and agree to the responsibilities listed in this document.

Signature: _____ Date: _____