



S F S THE SCHOOL
FOR FIELD STUDIES

Directed Research

SFS 4910

Syllabus
4 credits

The School for Field Studies (SFS)
Center for Ecological Resilience Studies
Atenas, Costa Rica

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise. Course content may vary from semester to semester.

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COURSE CONTENT SUBJECT TO CHANGE

Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;
- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;
- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that they may present. In other words, this is a field program, and the field can change.

Center Research Direction

The directed research direction is defined by the Center for Ecological Resilience Studies Five-Year Research Plan (5YRP), which originates from the collaborative process between the center staff and local stakeholders. Through Directed Research, students will contribute to a growing body of scientific research that informs local conservation and resource management decisions on the development of social, cultural, and ecologically sound alternatives of natural resource use and biodiversity protection integrated by the 5YRP question:

How can Costa Rica respond to local and global challenges while securing the functionality of its natural and human systems?

Answers to the above question will improve the understanding of the impact of globalization, climate change, real estate expansion into rural areas, increased tourism visitation, and conflicts between parks and people regarding land-use change within the cultural context of Costa Rica and within the constraints imposed by the covid-19 pandemic moving towards a resilient world society that understands and values nature's complexity and the interplay between ecosystem and social resilience.

Intellectual Property: There are many implications about intellectual property and the use of data and research frameworks beyond your semester experience. Many DR projects form part of ongoing and developing research lines at SFS Centers, the work of which is the intellectual property of SFS faculty. However, faculty are always interested in continuing collaborations, and there is often the possibility for student *co-authorship* on future academic publications. We will discuss the ethics of data gathering and academic publications during the semester, but you can also review in advance SFS's [data policy](#).

Course Overview

The goal of this course is to give students the opportunity to apply the scientific method in a field study project addressing a local environmental issue. This course teaches students how to spot hidden assumptions in scientific methodologies and how to distinguish between fact and interpretation, causality and correlation, and objectivity from advocacy. The course will provide you with extensive hands-on experience conducting research in tropical settings on a topic of urgent importance to specific clients working in the field of sustainable development.

Each student will be a member of a faculty-led team that will conduct field research, data analysis, and results communication in one or more of the following disciplines: ecology, natural resource management, and social sciences. The course builds on the material students have gained in core courses and includes Directed Research lectures and workshops that are specifically designed to help students comprehend the scientific process, test hypotheses, and present results in both written and verbal formats. As a result, students will go through the steps of the research process, including identifying relevant questions in the context of a region's economic, ecological, and cultural context, as well as client needs; experimental design; field data collection; statistical data analysis methods; and presentation of results to interested parties and the scientific community. Students will use concepts and approaches gained in class, field lectures, and field exercises to their research projects, assisting in the delivery of technical knowledge to our stakeholders.

The specific research projects conducted each semester vary, pending discussions with collaborators, current work being carried out at the Center, and student interests.

Learning Objectives

The core skills students will learn in this course are field techniques, analytical methods, skills, and critical thinking, as well as teamwork, and time management. The specific objectives of the course are:

1. Understand the process of **designing** a field research project
2. **Conduct** field sampling
3. Manage, interpret, and analyze **data** sets
4. **Communicate** research results to diverse audiences
5. Manage teamwork within the context of **collaborative** research

Assessment

We expect active participation in all aspects of DR, from the discussion and analysis of assigned readings and associated literature, the review of new literature, classes, and field components (data collection, data compilation, and data analyses). The DR experience is a group effort and there is the option of developing different products of this process (i.e., posters, blog, and written reports) in a collaborative manner. All members of the DR group work together to collect data in the field. Working individually or in groups, students will identify and address a distinct question within the overall project and will be responsible for data analysis, interpretation, and communication of their own results. Each topic will address the overall objectives of the research problem at hand, and may use the current data, previous research if available, or a combination of the two. The aim is to give you enough room to develop your own individual or group creativity within the context of the Directed Research project at hand. All topics must be related to the general questions and objectives, which are part of proposed research problem and the overall Center's 5YRP.

Performance in the Directed Research course will be evaluated based on the assessment items and their proportional weight to your final grade described below. Each assessment item will be evaluated on an individual or group basis depending on the chosen modality (individual or collaborative DRs).

Assessment Item	Value (%)
DR Field Skills	10
Statistics Homework	5
Literature Review	10
First DR Paper	30
Final DR Paper	10
Oral Presentation	10
Data Management	5
Integrated Assignment	5
Participation	15
TOTAL	100

DR Field Skills (10%)

Your Directed Research field skills will be graded throughout the DR course by your supervisor, who will consider your attendance to all DR activities, active involvement and competencies in field data collection, quality of data collection, data interpretation and analyses, and group participation/support. Students will produce a short report, map, or other final project, as determined by each professor, based on the research done prior to DR.

Statistics Homework (5%)

Your DR advisor will assign an exercise on statistics using data collected during the DR field research skills (which could include a short report depending on your DR group), data from previous experiments, etc. The details of the statistics homework will be explained by your DR advisor.

Literature Review (10%)

Your DR advisor will indicate the number and type of scientific sources you will be exploring to support your research topic for your DR paper. It is expected that you will find, read, interpret, and provide criticism of the scientific literature.

First DR Paper (30%)

The first draft is written in the style of a peer-review submission to a journal in the appropriate field. You will have ample opportunity for guidance from your DR supervisors throughout the DR period and especially during DR data analysis week. It is expected that you will integrate exercises from the core classes, and the previous DR classes (scientific method, statistical analyses, etc.) into the generation of a sound first draft considering that it has an important weight on the final grade of this course. Adjusting to the format described in “Directions for writing scientific reports” is critical.

Final DR Paper (10%)

The final paper should integrate all the corrections and edits requested by your DR advisor. Consistent with the first draft, the final paper should adjust to all format and content following the “Directions for writing scientific reports”.

Oral Presentation (10%)

You will present your DR work in a conference style presentation of 10-15 min length with additional time for questions. Unless the scope of your DR project is very small, you should not attempt to squeeze in everything from your final report into this presentation. Making sure that you are within the time limit is a very important skill therefore thorough rehearsal is important. Your grade will be based on the clarity, presentation structure, quality and clarity of graphics, and overall information delivery.

Data Management (5%)

It is important to record and store research data in a manner that is useful. You will need to provide (as applicable) Excel sheets with your research data in a format that is intelligible to someone else. You may need to provide both raw and manipulated data you used to create figures, tables and to run statistical tests. You need to annotate your spreadsheets (use text boxes if appropriate) so that an outsider can understand what the data are. You may be required to provide field notes on your findings for review.

Integrated Assessment (5%)

The ability to summarize your research in a poster, a blog, a short essay, is a very important skill. Your grade will be based on the clarity of the information, the structure of the poster, as well as on its aesthetic value. Your DR advisor will indicate what format will be the best format to summarize the DR results.

Participation (15%)

Science is a social activity. Developing the necessary skills to work as part of a team is a critical aspect of scientific research, both in the field and back at the Center in terms of collaborating in data collection, data analyses, and data presentation.

Grading Scheme

Grade corrections in any of the above items should be requested in writing at least 24 hours after assignments are returned. No corrections will be considered afterwards.

A 95.00 - 100.00%	B+ 86.00 - 89.99%	C+ 76.00 - 79.99%	D 60.00 - 69.99%
A- 90.00 - 94.99%	B 83.00 - 85.99%	C 73.00 - 75.99%	F 0.00 - 59.99%
	B- 80.00 - 82.99%	C- 70.00 - 72.99%	

General Reminders

Plagiarism – Using the ideas and material of others without giving due credit, is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively (e.g., allowing someone to look at your exam). All assignments unless specifically stated should be individual pieces of work.

Deadlines – Deadlines for written and oral assignments are instated for several reasons: they are a part of working life to which students need to become accustomed and promote equity among students. Deadlines allow faculty ample time to review and return assignments before others are due. Late assignments will incur a 10% penalty for each day that they are late. No assignment will be accepted after three days. Assignments will be handed back to students after a one-week grading period.

Participation – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade simply because there is little room to make up for lost time. Participation in all components of the program is mandatory because your actions can significantly affect the experience you and your classmates have while at SFS. Therefore, it is important that you are prompt for all DR activities, bring the necessary equipment for field research, and simply get involved.

Course Content

L: Lecture, **WS:** Workshop, **D:** Discussion

DR Coursework Component: The coursework component of the DR is designed to prepare the students to conduct scientific research. The lectures are delivered throughout the semester, in conjunction with the topical courses, so that students are well prepared to work with their faculty mentor on meaningful research. Some of the course activities below will be delivered to the whole class, or as part of your specific DR group once you have selected a given project.

No	Title and outline	Type	Hours
DR01	Directed Research Introduction (intro to SFS 101) The 5-year research direction, as well as the impact of the Center's research at the local and national level is discussed. We'll explain how research is integrated with other academic and outreach activities at the Center.	L	0.5
DR02	Risk and Time Management in Field Research The most common sources of risks while doing field research within the context of Costa Rica will be discussed and analyzed during this lecture. Special emphasis is given to sound planning and time management in the design of scientific research.	L	1.0

DR03	How to write scientific reports Students will learn the basic format of the research paper. In addition, the structure of the presentation of scientific information is discussed and explained to the students.	L	1.0
DR04	Stats 1: Introduction to statistical distributions and hypothesis testing Students will learn the concept of statistical distributions, parameter determination, and hypothesis testing along with practical examples.	L; WS	2.0
DR05	DR agenda presentation and group division Professors will present the DR projects planned for the semester, going over logistics, methods, and major goals. Students will select their DR project.	L; D	1.0
DR06	Stats training Statistical classes (t-test, ANOVA, regression, correlation, contingency table analyses, multivariate techniques) will be delivered by each professor depending on the characteristics of the research project	L; WS	5.0
DR07	Introduction to Scientific Methods Students will learn different methods to carry out scientific research by identifying relevant questions and designing testable hypotheses. Alternative methods of scientific inquiry are discussed (i.e., deductive, inductive, hypothetical-deductive, etc.)	L	1.0
DR08	Ethical Research Practices Faculty and students will discuss problems associated to ethical issues in research, such as data manipulation, pattern recognition, plagiarism, animal rights, and related questions.	L	1.0
DR09	Effective Communication Skills students will learn appropriate ways of presenting scientific information in a power point presentation as well as posters specific to their DR.	L	1.0
DR10	Stats training Statistical classes (t-test, ANOVA, regression, correlation, contingency table analyses, multivariate techniques) will be delivered by each professor depending on the characteristics of the research project	L; WS	5.0
DR11	Literature Review Students will learn the use of different databases and repositories available on the internet. In addition, they will get acquainted with resources available at the Center, such as previous reports, gray literature, and peer-review papers.	L	1.0
Total			19.5 Hours
DR Research Component This portion of the DR course is made up of research time, which includes data collection, synthesis, and dissemination. Given the intense nature of the Directed Research project, students receive over 140 contact hours during this period.			Days Allocated
Data Collection Students work within their DR group to go into the field to collect data			10 days
Data Synthesis Students work closely with their faculty mentors to analyze their collected data and write up their findings in a structured scientific paper			5 days
Research Dissemination Students prepare, practice, and deliver presentations for SFS and community audiences.			3 days
Total			18 days