

BOTTLENOSE DOLPHIN RESEARCH INSTITUTE - BDRI

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FIELD RESEARCH COURSES (FRC) IN MARINE MAMMALS SCIENCE

FRC 1002 SOCIAL RELATIONSHIPS AND COMMUNICATION IN A FISSION-FUSION SOCIETY

SYLLABUS
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1. COURSE OVERVIEW

This advanced course provides an in-depth, hands-on immersion into the field and laboratory methods for behavioural ecology and communication of dolphins. This intensive training course abroad is developed with varied curricular designs and varied instructional strategies in order to meet specific learning goals. The exclusive FRC learning model helps students to connect the conceptual material presented in this course to case studies, learn field research techniques, collect and analyze field data, and develops holistic and critical thinking skills.

FRC 1002 aims to provide specialization in behavioural methods, focusing in particular on bottlenose dolphin social behaviour and communication, achieving an integrated approach to the understanding of the behavioural complexity of this species.

As a result of successful completion of this specialization course, attendants will gain a deeper insight into behavioural research concepts and methodology, underlying social dynamics and communication. By the end of the course, students will be able to design a simple project to assess the social organization of a bottlenose dolphin population. In addition, course attendants will get experience in using bioacoustical methods via computer practical sessions involving classification and analyses of bottlenose dolphin vocalizations.

2. LEARNING OBJECTIVES

Following this course, students should:

- Design a simple project to assess the social organization of a bottlenose dolphin population.
- Describe and quantify the vocal repertoire of a bottlenose dolphin population via computer practical sessions.



- Estimate population abundance using closed mark-recapture methods applied to photoidentification data.
- Explain the importance of the photo-identification technique, and discuss the strengths and weaknesses of this method.
- Establish and follow line transect boat-based surveys and explain the importance of experimental design.
- Extract manually and automatically dolphin dorsal fin outlines from digital photographs, identify individuals and create a catalogue.
- Use Hinde's framework for the study of social behaviour.
- Describe the patterns of association of a coastal bottlenose dolphin population and test if bottlenose dolphins have preferred or avoided associates
- Calculate the association index, Mantel tests, matrix correlation coefficients, and the Monte Carlo permutation tests using the software SOCPROG
- Outline the whistle acoustic features of free-ranging bottlenose dolphins and determine the contour of whistles by visual analyses of the spectrogram
- Discriminate the different types of burst pulsed sounds by visual and aural analysis of the sonograms.
- Apply appropriate statistical techniques on biological data sets and give an interpretation of the results

3. COURSES FORMAT AND ELEMENTS

The academic program is 10 days long, and each day contains activities and assignments designed to increase understanding and application of a given topic. This course contains two modules. The first module will introduce students to the main type of field and analytical methods concerning social relationships and communication of wild bottlenose dolphins. In the second module, course attendants will apply all methods on case studies, and perform analyses of example data.

Each day includes some or all of the following elements:

Introduction and Learning Outcomes

The introduction presents an overview of the day's topic, and the Learning Outcomes indicate what you should be able to do by the end of the day that demonstrates your mastery of the topic.

Lectures and Learning Resources

The FRC lectures survey an extensive amount of information, theories and ongoing investigations concerning bottlenose dolphin research. Learning Resources for each day may include to watch videos and to read from scientific articles, PowerPoint slides, etc.

Hands-on activities

A Hands-on Activity often is a practical field or laboratory experiment (i.e. use of GPS onboard to follow a linear transect, quantify vocal repertoire via computer practical sessions).

Discussion

Daily discussion is an important activity based on the underlying belief that students learn from one another, hopefully ending with a constructive brainstorming on the specific topic. For each required



Discussion question, you are required to give a response to the question and to respond to at least one of your colleagues' comments. Note that you are welcome (and encouraged) to respond to more than one colleague. For Discussion in these courses, the instructor may place students into small groups. You will remain in that group for Discussion throughout the course.

Content Review Quiz & Final exam

These quizzes may count toward your course grade whereas some quizzes may be for practice. There may be a quiz every three days and a final exam in Day 10.

Day off

Throughout all courses, one day a week is reserved for studying and relaxing (generally Sundays).

During program time you will find yourself following a rigorous schedule, however, one must be very flexible for changes occur all of the time! Please be aware that the schedule may vary depending on season, weather and FRC priorities. For instance, a windy day may force the staff to cancel a survey at sea and instead conduct hands-on video and computer analysis.

Please try to be flexible and understand that a program dealing with wild animals at sea cannot be 100% predictable. After the first day of orientation, the program will include a minimum of 8 hours of contact field work and lectures each day. Expect to wake up between 6:00 am and 8:30 am depending on the activities scheduled and period of the year. The program is intensive and highly structured. Generally classroom lectures alternate with field sessions. If lectures are before lunch, time after lunch will be in the field and vice versa.

4. EVALUATION AND GRADING SCALE

FRC are rigorous and challenging, and our approach mandates that students demonstrate their knowledge of theory and practice by applying such theory and practice to actual problems. Grades will be determined by a percentage of total points earned on all course elements. As FRC exams are based on application of knowledge, rather than rote memorization, the courses are generally thought of as difficult. Do not expect grading to be similar to your university, many students are surprised by how hard the professor grades.

GRADE	PERCENT	POINTS
A	90-100 %	4.0
B	80-89 %	3.0
C	70-79 %	2.0
D	60-69 %	1.0
E	below 60 %	0

FRC programs are foreign based, field orientated, and require fulltime on site participation in all program activities; therefore, BDRI does not grant incompletes.



ASSESSMENT	NUMBER OF DAYS	VALUE
Participation grade	9	15 %
Field Exercises	6	35%
Lab Exercises	7	35%
Content Review Quiz	3	5%
Final exam	1	10%

Participation grade

Participation in class discussions (6) and lectures (12) factors into this grade, We reserve the right to adjust this grade 15% in either direction.

Field exercises

During these field exercises, the student will be employing methods outlined during the lectures to collect data about presence and distribution of common bottlenose dolphins along the nord-eastern coast of Sardinia, Italy.

Lab exercises

The objective of the lab exercises is to enhance student ability to analyze and present scientific data, and produce a report on the results.

5. ACADEMIC EXPECTATIONS

The academic atmosphere we try to create at BDRI is that of a community of learners. Students come from a wide range of universities worldwide as well as from a variety of academic backgrounds. You will be able to challenge yourself intellectually in areas you are not familiar with and to act in a leadership role in those areas in which you have expertise.

It is strongly recommended that each student keep copies of all written papers, completed tests, assignments, lecture notes, handouts, and reading assignments for the student's own future use, and for possible discussions with faculty advisors.

BDRI cannot guarantee that students will receive credit for their FRC from their home institutions. It is the responsibility of the student to arrange credit with their home school prior to FRC participation. Students intending to receive academic credit at their home institution should speak with their academic advisor about how to best proceed. Students should allow time to have their FRC program approved by their advisor and other appropriate personnel before the start of the program.

DATA AND EDUCATIONAL MATERIALS OWNERSHIP

BDRI is the owner of all work products developed and research data collected by students while participating in an FRC program or through the use of facilities or funds provided by or through BDRI. No student may utilize these data for any purpose other than scholarly FRC works. The use of these data by students for undisclosed and unapproved personal benefit or commercial application, financially or professionally or in any other way is not permitted.

Students who have collected data during their FRC will have access to all of that specific data (and no other data) for a one year period after completion of their FRC for the explicit purposes of developing these or other scholarly works.

6. COURSE ANALYSIS

DAY	COURSE ELEMENT & TITLE	DESCRIPTION	TIME (HR:MIN)
1	Ice-breaking session	- Registration, basic orientation and information about safety and operational objectives.	2:00
1	Lecture 1: Academic Introduction	- philosophy of the course - conceptual map of learning units - case studies - course requirements - study strategies for success	0:45
1	Lecture 2: Common bottlenose dolphins	- characteristics & physiology - life history & reproduction - ecology & behaviour - habitat & group size	1:00
1	Lecture 3: Review of bottlenose dolphin field studies	- importance of long term studies	1:00
1	Introduction to the field exercises	- case studies - use of scientific equipment - data collection	0:45
1	Video session 1		1:00
2	Field exercise 1: Observational methods	- dedicated boat based surveys	4:00
2	Lecture 4: Observational methods	- observation effort - defining group & sighting - boat based studies - land based studies	1:00
2	Lecture 5: Identification methods 1	- natural markings and tags - Photo-identification 1: field methods	1:00
2	Discussion 1: Selecting a research platform, identifying bottlenose dolphins	- strengths and weaknesses of research platforms - photo-identification: advantages and disadvantages	1:00
2	Video session 2		0:45
3	Field exercise 2: Observational methods	- boat based line transect sampling	4:00
3	Lecture 6: Identification methods 2	- Photo-identification 2: laboratory methods	0:45
3	Lecture 7: Population dynamics	- total counts - line transects - individual recognition - mark-recapture	1:30
3	Lab exercise 1: Computer orientation	- Photo-identification: laboratory methods 1 (fin-recognition software packages Finex, Finmatch, Darwin)	0:45
3	Discussion 2: Population dynamics	- strengths and weaknesses of these methods	0:30
3	Content Review Quiz 1		0:30



4	Field exercise 3: Observational methods	- photo-identification method - boat based line transect sampling	4:00
4	Lecture 8: Abundance estimation	- closed capture-recapture models	1:00
4	Lab exercise 2: Computer orientation	- Photo-identification: laboratory methods 2 (fin-recognition software packages: Finex, Finmatch, Darwin) - dorsal fins catalogue	2:00
4	Discussion 3: Mark recapture models & extraction of dorsal fin outlines	- strengths and weaknesses of these models - manual and automatic extraction of dorsal fin outlines	1:00
5	Field exercise 4: Observational methods	- sampling methods - boat based photo-identification - acoustic recording	4:00
5	Lecture 9: Sampling methods	- sample length & protocol - behavioural sampling	0:45
5	Lecture 10: Studying bottlenose dolphin social structure	- dolphins socioecology - Hinde's framework - association patterns & social relationships	1:00
5	Lab exercise 3: Computer orientation	- introduction to GIS - use of SOCPROG (1) software	1:30
5	Video session 3		0:45
6	Field exercise 5: Sighting methods	- land based surveys	4:00
6	Lecture 11: Bioacoustics	- acoustics techniques - acoustic terms - sounds emission and reception	0:45
6	Lab exercise 3: Computer orientation	- use of SOCPROG (2) software - introduction to MARK software	1:45
6	Discussion 4: Acoustic studies	- strengths and weaknesses of these techniques	0:45
6	Content Review Quiz 2		0:45
7	Day off		
8	Lecture 12: Bottlenose dolphin communication	- sensory modalities for communication - echolocation - acoustic communication - intraspecific communication - whistles & burst pulsed sounds - signature whistles	1:30
8	Lab exercise 4: Computer orientation	- sounds analysis software - visual and aural analysis of the sonograms - whistle ratio - whistle acoustic features	1:30
8	Lecture 13: Statistical analysis	- univariate statistics - multivariate statistics	2:00



8	Lab exercise 5: Database	creation of a database	1:00
8	Discussion 5: Social signals & Group living	- why do bottlenose dolphins form groups? - functional aspects of social signals	1:00
8	Video session 4		0:45
9	Field exercise 6: Observational methods	- sampling methods - boat based photo-identification - acoustic recording	4:00
9	Lecture 14: Fission-Fusion societies	- female reproductive strategies - male reproductive strategies - social bonds & bisexuality bonded model	1:30
9	Lab exercise 5: Statistics	- Statistical analysis of example data for case studies	1:00
9	Discussion 6: The future of behavioural research on bottlenose dolphins	- further research - role of the social relationships and communication in dolphins conservation	0:45
9	Content Review Quiz 1		0:45
10	Lecture 15: BDRI's Current Research	- Use of habitat & distribution - Communication - Social structure - Interaction with human activities - Opportunistic foraging - Ecological modelling	2:00
10	Lab exercise 6: Presenting research reports	- students presentation (specific personal project about a selected case study)	2:00
10	Final exam		1:00
10	Final evaluation and certificate of attendance		