

	<b>Course Syllabus (Fall 2016 Session I)</b>
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**Last Date Revised: March 18, 2016**

**I. COURSE NUMBER AND TITLE:      BCOR-5570-OD1 Biostatistics  
OCOR-5603-OD1 Biostatistics**

Days: **Thursday 6:30-9:30 PM**  
Building & Room: **Forman Computer Lab**

**II. INSTRUCTOR:**

Joana Figueiredo, Ph.D.  
Phone: (954) 262-3638                      Email:      [jfigueiredo@nova.edu](mailto:jfigueiredo@nova.edu)  
Office: Guy Harvey, 2<sup>nd</sup> floor, #219  
Office Hours: By appointment.

**III. COURSE DESCRIPTION:**

This graduate course will give introduce the most commonly used statistical tests and procedures to analyze biological and ecological data. The main objective is to prepare the students to identify the most correct statistics to analyze biological data, perform the statistical analysis in R and correctly interpret the results. Lectures will consist of short theoretical presentations followed by a lab where students will do guided exercises in R. Students will be required to do readings prior to the class on the theoretical basis of the theme of the week, and perform unguided exercises (homework) to cement knowledge.

**IV. COURSE LEARNING OUTCOMES\*:**

At the conclusion of this course the student will be able to:

- Describe critical aspects of data such as scales of measurement
- Identify if the variables are discrete or continuous.
- Calculate summary statistics.
- Create appropriate graphs, charts, maps, and tables to represent data.
- Determine the appropriateness of various statistical tests and procedures for analyzing different types of biological data.
- Analyze biological data using the appropriate statistical test(s) in software R

- Correctly interpret results of statistical analysis
- Write a grammatically perfect, technically informed, well-structured document with regards to data analysis.\*

\*These are directly related to the Program Learning Outcomes for Marine Biology, Coastal Zone Management and Marine Environmental Science.

## V. REQUIRED TEXTS AND MATERIALS:

Quinn, G.P. (2002) Experimental Design and Data Analysis for Biologists. Cambridge.

Recommended consultation of:

Crawley, M.J. (2007). The R book. John Wiley & Sons, New York

Dalgaard, P. (2008). Introductory Statistics with R. (2nd edition). Springer: New York.

Logan, M. (2010) Biostatistical Design and Analysis Using R. Wiley-Blackwell

## VI. COURSE SCHEDULE AND TOPIC OUTLINE:

Week	Date	Topic	Logan Chapter(s)	Other books Chapter(s)
1	August 25	Course presentation Introduction to software R Import and Export data Discrete and continuous variables Sampling and Experimental Design Descriptive statistics <b>Lab: Introduction to R, Descriptive Statistics</b>	1, 2, 3, 4, 5,	Dalgaard 1,2 Crawley 1,2,3,4
2	September 1	Correlation and Linear regression <b>Lab: Regression</b>	7, 8, 9	Dalgaard 3,4 6 Crawley 5,10
3	September 8	Multiple Linear Regression (inc. model selection) Curvilinear regression <b>Lab: Regression</b>	9,17	Dalgaard 11, 12, 16 Crawley 10, 20 Crawley Ch. 13

4	September 15	<i>QUIZ</i> <i>t</i> -test Assumptions Data transformation One sample <i>t</i> -test Paired <i>t</i> -test <i>t</i> -test <b>Lab: <i>t</i>-test</b>	6, 3 (pp. 68-69)	Dalgaard Ch. 5 Crawley Ch. 8
5	September 22	One-way ANOVA Two-way ANOVA Nested ANOVA <b>Lab: ANOVA</b>	10, 11, 12	Dalgaard Ch. 7,9 Crawley Ch. 11
6	September 29	Factorial ANOVA Analysis of covariance (ANCOVA) <b>Lab: ANOVA and ANCOVA</b>	12, 13, 15	Crawley Ch. 12
7	October 6	Repeated Measures ANOVA Survival Analysis <b>Lab: ANOVA and Survival Analysis</b>		Dalgaard Ch. 14 Crawley Ch. 25
8	October 13	<i>QUIZ</i> Frequency Analysis Chi-square statistic Goodness of fit Contingency tables <b>Lab: Simple Frequency analysis</b>	16	Crawley Ch. 7, 14,15
9	October 20	Principal Component Analysis Discriminant analysis Cluster Analysis <b>Lab: Multivariate Data Analysis</b>		Crawley Ch. 23
10	October 27	<i>QUIZ</i> <b>Review and Lab exercises (all topics): Preparation for final</b>		
11	November 3	<i>QUIZ</i> <b>Review and Lab exercises (all topics): Preparation for final</b>		
12	November 11	<b>Final (open book)</b>		

Note: This is a tentative schedule that may be changed. Students will be provided a minimum one week advance notice of any change when possible.

## VII. GRADING CRITERIA

**Final:** 50% (multiple choice, short answer and exercises): open book

Make-up finals: let me know *as soon as possible* and *before the final occurs* if you know you will be absent the day of the final. Valid excuses for missing a final include documented illness or family or personal tragedy.

**Homework (Lab reports):** 20% (due every Wednesday).

Notes: (1) For the successful completion of 3 "challenges" (exercises of greater difficulty which are not required for the final grade) will lead to the exclusion of the lowest grade homework from your grade average. (2) Students that submit a homework that has been copied from or copied by others (i.e. if a student lends its homework to copy to others) will receive 0%.

**Quizzes:** 20% (5% each)

**Classroom participation:** 10% (quantity of quality interventions, include explanation of exercises on the board)

## VIII. COURSE REQUIREMENTS AND POLICIES:

### ATTENDANCE

As a requirement for accreditation, regular attendance is necessary. Each professor has the responsibility to enforce class attendance. To fulfill this requirement, students must have logged in, accessed, and/or interacted with the majority of online course requirements (e.g. assignment submissions, asynchronous discussion) by the first week of the session or they may be withdrawn from the course by the instructor through the Program Office. For this reason, if students anticipate or encounter any reason why they may be unable to engage with their online coursework for an extended period during a term, they must communicate this to their instructor and the Program Office as soon as possible. Students do have the option of requesting an Incomplete; if this is granted by their instructor, they then have 3-months from the end of the term date to submit the required course work as decided with the instructor. An incomplete grade agreement form must be completed and filed with the distance education office. An instructor reserves the right to request original written documentation to substantiate any such absences. A falsified excuse is cause for disciplinary action. An Incomplete course graded I must be completed in one semester or the grade is changed to F. All students are referred to the section 3.5.2. of the Oceanographic Center catalog (<http://nova.edu/ocean/forms/nsuoc-2014-2015-catalog.pdf>) for details on course withdrawals and refunds.

### ACADEMIC HONESTY

In order to ensure the highest standards of academic honesty and ethical behavior, the NSU policies on cheating and plagiarism will be strictly enforced. See the NSU Student Handbook for more information at <http://www.nova.edu/cwis/studentaffairs/forms/ustudenthandbook.pdf>. I am empowered by the policy to penalize a student suspected of academic dishonesty, plagiarism, or otherwise misrepresenting work and I will do so and report that student to the Dean of the OC. Nova Southeastern University has contracted with **turnitin.com** to provide plagiarism detection services, and I will submit any suspicious documents to this service.

The use of cell phones, or any other electronic devices not specifically allowed by me, during an exam is not permitted. The use of such devices for any reason will be assumed to be for the purposes of cheating and will result in your dismissal from class and administrative action up to permanent expulsion from all NSUOC programs. If you need the phone for emergency notifications, or the like, leave the phone with me or the proctor at the start of class. You will be immediately notified if there is an incoming call.

## EXPECTATIONS

You can expect that I will arrive on time for lectures and be well prepared. You can expect that I will be clear about my expectations and the criteria I use in assigning grades and that I will be fair and equitable. I will treat everyone in the class with consideration and respect.

I expect you to come to class, arrive on time, and be prepared for lecture and lab. I expect you to turn off your cell phones, pagers, and hand-held electronic devices as a gesture of reciprocal respect. If you bring a computer to class, I expect you to use it to take notes and record classroom information. I expect you to stay awake, take notes, participate in discussions and ask questions. I expect you to turn in your assignments on time and in good condition.

## X: UNIVERSITY-WIDE POLICY STATEMENTS

**A. Academic Misconduct:** Academic misconduct appears in a variety of forms (including plagiarism). It is a violation of NSU academic policy and may be punished in a variety of ways, from failing the assignment and/or the entire course to academic probation, suspension or expulsion. If you have questions about what constitutes academic misconduct before handing in an assignment, see your instructor or the NSU Student Handbook at <http://www.nova.edu/cwis/studentaffairs/forms/ustudenthandbook.pdf>.

**B. ADA Policy:** Nova Southeastern University provides accommodations for students with documented disabilities. If you have a disability for which you believe you require accommodation, please contact Academic Services (<http://www.nova.edu/disabilityservices/>, 954-262-7189).

**C. Last Day to Withdraw:** You will be able to obtain a full refund of your tuition before session II begins, a 75% refund before the end of the 1<sup>st</sup> week of Session II. There will be no refund after that date. None of the lab fees is refundable. It is your responsibility to formally withdraw by completing the appropriate forms to obtain a refund.

(<http://www.nova.edu/ocean/coursepolicy.html>). A request for tuition refund must be made in writing at the time of withdrawal. Refunds will be made solely at the option of the university and will be based on the legitimacy of the reason for withdrawal. Should you fail to appropriately withdraw from this course, and then earn a grade below your expectations, I will do what I can to see that the grade is reported on your transcript.

**D. Email Policy:** All email communications between students and faculty must be conducted via NSU email accounts (<http://www.nova.edu/common-lib/policies/emailcomm.policy.html>). This requirement will assist NSU in communicating more effectively and protecting your privacy. Emails sent to faculty from non-NSU accounts will be returned to the sender with instructions to resend the communication from your NSU account. To set up an NSU email account or to get help with an existing account, go to [https://www.nova.edu/sbin/account\\_request](https://www.nova.edu/sbin/account_request). Also, the computer help desk is available to assist you with questions regarding your NSU email account. It can be reached at 954-262-HELP (4357).

**E. Student Course Evaluations:** Student comment and feedback evaluating each college class is an important tool to evaluate program effectiveness. Participation in this process is a responsibility of each student.

## F. Grading System

The following system is used to grade academic performance:

GRADE	Percent grade	DESCRIPTION
<b>A</b>	93-100	Excellent
<b>A-</b>	90-92	Very Good
<b>B+</b>	87-89	Good
<b>B</b>	83-86	Satisfactory
<b>B-</b>	80-82	
<b>C+</b>	77-79	
<b>C</b>	73-76	Marginal Pass
<b>C-</b>	70-72	
<b>D+</b>	67-69	
<b>D</b>	65-66	Poor
<b>F</b>	0-64	Failure
<b>W</b>		Withdrawal: Given after the third class week or termination by the instructor for non-completion of the course by the student.
<b>I</b>		Incomplete: Given when most (80 percent), but not all, work has been completed.
<b>Au</b>		Audit
<b>P</b>		Pass

A grade of incomplete (I) must be requested from the instructor, have the Associate Dean's approval, and be accompanied by a **completed contract specifying outstanding course requirements and completion dates**. Completion of the course graded incomplete must occur within one semester (or 3 months) of the end of the course and the incomplete be changed to a

different grade. If the course is not completed in 3 months, or the student has not withdrawn and received a W, the incomplete will automatically be converted to a grade of F. Under unusual circumstances students may request a time-extension to complete the course. Such requests must be submitted to, and approved by, the Associate Dean of Academic Programs prior to the end of the 3-month time limit. **There are no exceptions to this rule. Securing the completed and signed incomplete contract forms is the responsibility of the student.**