FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Undergraduate Programs

Department

College Wilkes Honors College

*(To obtain a course number, contact **erudolph@fau.edu**)*

UUPC Approval 12-6-21
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Prefix BSC **Number** 4442	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code** C	**Type of Course** Lecture/Lab	**Course Title** Honors Molecular Ecology

Credits *(Review Provost Memorandum)*: 3

Effective Date *(TERM & YEAR)*: Spring 2023

Grading *(Select One Option)*
- **Regular** (●)
- **Sat/UnSat** ( )

Course Description *(Syllabus must be attached; see Template and Guidelines)*

This course is an introductory course that focuses on characterizing individuals, populations, and species through molecular variation (Deoxyribonucleic Acid -DNA). It includes theory and laboratory sections and provides the basis for DNA analyses in any living organism. Molecular markers will be used to quantify genetic diversity, track movement of individuals, measure inbreeding and characterize new species. Students will learn how to use these methods in the laboratory and through computer analyses.

Prerequisites, with minimum grade*	**Corequisites**	**Registration Controls** *(Major, College, Level)*
BSC 1011, 1011L; BSC 1010, 1010L; CHM 2046, 2046L	None	Wilkes Honors College

***Default minimum passing grade is D-.** **Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course**

WAC/Gordon Rule Course

☐ Yes ☑ No

WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See WAC Guidelines.

Intellectual Foundations Program (General Education) Requirement *(Select One Option)*

None

General Education criteria must be indicated in the syllabus and approval attached to the proposal. See GE Guidelines.

Minimum qualifications to teach course

Ph.D. in Biological Sciences or a closely related discipline

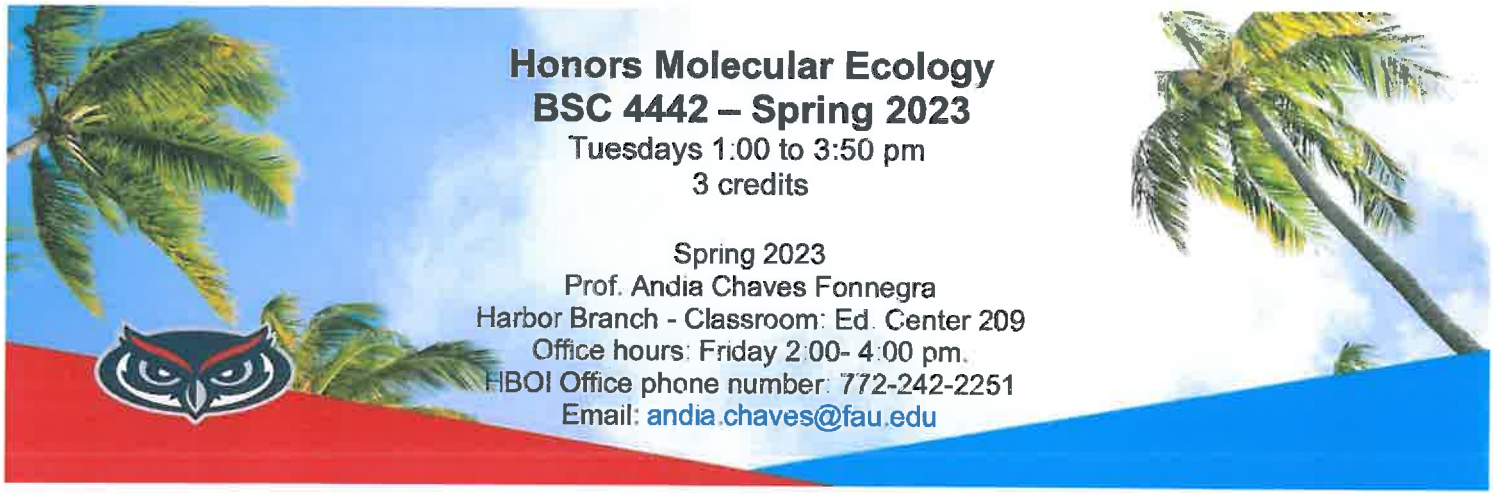
Faculty Contact/Email/Phone

Andia Chaves Fonnegra/andia.chaves@fau.edu

List/Attach comments from departments affected by new course

Approved by		***Date***
Department Chair	William O'Brien (Digitally signed by William O'Brien, Date: 2021.11.08 10:28:33 -05'00')	11/8/2021
College Curriculum Chair	Nicholas R. Baima	11/15/2021
College Dean	Justin Perry	11/12/21
UUPC Chair	Dan Meeroff	12-6-21
Undergraduate Studies Dean	Edward Pratt	12-6-21
UFS President		
Provost		

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.



Office	WHC SR 234/ HBOI Lab1-137
Office hours	Fri 2:00-3:00 pm and Wed 2:00-4:00 pm
Telephone	561-860-7098
Email	andia.chaves@fau.edu

Course Description

This course is an introductory course that focuses on characterizing individuals, populations, and species through molecular variation (Deoxyribonucleic Acid -DNA). It includes theory and laboratory sections and provides the basis for DNA analyses in any living organism. Molecular markers will be used to quantify genetic diversity, track movement of individuals, measure inbreeding and characterize new species. Students will learn how to use these methods in the laboratory and through computer analyses. Molecular DNA techniques are essential in a wide range of applications, from conservation biology to evolutionary ecology. DNA is frequently used to understand which populations are endangered and at risk of inbreeding and to solve wildlife forensics, stock assessments, and parentage analysis cases. This course is usually taught during the Semester by the Sea Program at Harbor Branch Oceanographic Institute (HBOI).

Instructional Method

Classes will include lectures, student presentations, and class discussions about the main concepts and ideas presented during class and assigned readings. Students are encouraged to seek clarification of complicated topics by asking questions during presentations or office hours. Lab sessions will include molecular laboratory techniques and lab computer sessions for data analysis. Lab sessions are designed to give you practical hands-on experience with most of the techniques covered in the lecture portion of the course.

Prerequisites/Corequisites

Two semesters each of introductory biology and general chemistry, i.e., BSC 1011, 1011L; BSC 1010, 1010L; CHM 2045, 2045L; and CHM 2046, 2046L.

Course Objectives/Student Learning Outcomes

At end of course, students will be able to

1. Explain how molecular markers can be used to address ecological questions.
2. Explain the molecular genetics basis of the methods used to detect genetic variation.
3. Analyze and interpret molecular ecology data (e.g. population genetics).
4. Explain what ecological research questions can be answered with molecular methods.
5. Discuss and evaluate molecular ecology literature (articles).

Course Evaluation Method

A large portion of the grade in the course will be based on a series of weekly assignments, paper discussions, and a final project. Students will receive datasets that to perform various analyses including statistical computations, searches in GenBank, phylogenetic analyses. The topics of the data projects will be defined based on students' interests, but will be within these major areas:

1. Wildlife forensics.
2. Genetically modified crops.
3. Overfishing.
4. Climate Change.

Course Grading Scale

	% of Grade Points
Weekly Assignments	70
Discussion of papers	10
Final Project	20
Total	***100%***

A	= 93 – 100	**B**	= 84 – 86.9	**C**	= 74 – 76.9	**D**	= 60 – 66.9
A-	= 90 – 92.9	**B-**	= 80 – 83.9	**C-**	= 70 – 73.9	**F**	= below 60
B+	= 87 – 89.9	**C+**	= 77 – 79.9	**D+**	= 67 – 69.9		

Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

Any late assignment will receive minus one point (-1) off per day.

Special Course Requirements (if applicable)

NA

Note of Honors Distinction: *This course differs substantially from the non-Honors version. First, and most importantly, the course is an agreement between the student and instructor that they will work together collaboratively to ensure a significantly enriched learning experience in a manner consistent with other Honors-designated courses at FAU. This means the course will produce substantive work that reflects interdisciplinarity and connections among academic fields, research and direct access to sources of knowledge pertinent to the field, leadership, creative and critical thinking, and engagement with the world outside the university. Secondly, the course will prepare students for upper-division data analyses and for work on the Honors Thesis. Students will be exposed to hands-on experiences, they will extract DNA and will perform gel electrophoresis analyses, they will participate in paper discussions and develop their own critical thinking. In addition, students will give in-class presentations about specific paper in their subject of interests and their final data projects can be related to their own honors thesis/research data. Finally, the course will develop critical attitudes and analytic skills that will teach the student to think for him-herself or themself.*

Policy on the Recording of Lectures (optional)

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or

scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Supplementary/Recommended Readings

Freeland, Joanna. R. 2011. *Molecular Ecology*. John Wiley & Sons. Second edition. Ltd England. There is a copy in the FAU-HBOI library.

- Other assigned papers relevant to lectures and lab of the week.

Software
Microsoft Excel
GENEPOP https://genepop.curtin.edu.au/
STRUCTURE https://web.stanford.edu/group/pritchardlab/structure.html
Galaxy (Possible) https://galaxyproject.github.io/training-material/topics/ecology/

Course Topical Outline

NOTE: This schedule is subject to change

Date	Week	Lectures	Lab
X/X	1	**Introduction** to Molecular Ecology – Applications of Molecular Data (DNA) to ecological studies.	Lab DNA extraction
X/X	2	Genetic Markers in Nuclear and Mitochondrial genomes. PCR	Lab DNA quantification and electrophoresis
X/X	3	Genetic Markers in Nuclear and Mitochondrial genomes. PCR	Aspects that influence genetic diversity- The Neutral Theory
X/X	4	Lab PCR– COI	Single Population- Genetic Diversity- Hardy-Weinberg Equilibrium
X/X	5	Lab- MEGA- Barcoding Phylo- GenBank	Lab GENEPOP software- Single pop (Computer Lab)
X/X	6	DNA Sequencing	DNA Fingerprinting (Lecture)
X/X	7	Identity – Probability of individuals having the same genotype (Lecture)	Paternity- Parentage Analysis (Lecture) Paper presentation- Students
X/X	8	Relatedness	Lab Parentage/Relatedness Software (Computer Lab) Paper presentation- Students
X/X	9	Spring Break	Spring Break
X/X	10	Conservation genetics -Inbreeding	Conservation Genetics - Bottlenecks Paper presentation - Students
X/X	11	IRL Ocean Discovery Course week	IRL Ocean Discovery Course week
X/X	12	Why COVID19 is suddenly part of our Molecular Ecology Course?	2bRAD Method-Lecture Paper presentation - Students
X/X	13	2bRAD Lab	Genetic Analysis of Multiple populations (Lecture pop subdivision, gene flow, F statistics) Paper presentation
X/X	14	Genetic Analysis of Multiple Populations (Lecture statistical testing and Genetic Distance)	Migration and Isolation by distance (Lecture) **Final Projects assigned.** Paper presentation - Students
X/X	15	Lab Assignment test STRUCTURE (Computer **Final Project**)	Lab Assignment test -STRUCTURE (Computer **Final Project**) Paper presentation - Students
X/X	16	**Final Project**	**Final Project due**