FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department Biological Sciences

College Charles E. Smith College of Science

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

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner _____
Catalog _____

Prefix PCB

Number 6468

(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)
Lab Code

Type of Course
Lecture/Lab

Course Title
Intermediate Molecular Ecology

Credits *(See Definition of a Credit Hour)*
3

Effective Date *(TERM & YEAR)*
Spring 2025

Grading *(Select One Option)*
Regular ◉
Sat/UnSat ○

Course Description *(Syllabus must be attached; see Template and Guidelines)*
This is a graduate 6000-level course in molecular ecology that focuses on characterizing individuals, populations, and species through molecular variation (DNA). It includes theory and laboratory (hands-on and computer labs) sections and provides the basis for DNA analyses in any living organism. Molecular markers and full genomes will be used for phylogenetics and microbiome analyses, quantify genetic structure and inbreeding in populations, and characterize new species and virus variants.

Prerequisites
None

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course.

Academic Service Learning (ASL) course ☐
Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Corequisites
None

Registration Controls *(For example, Major, College, Level)*
Biological Sciences

Minimum qualifications needed to teach course:
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field).

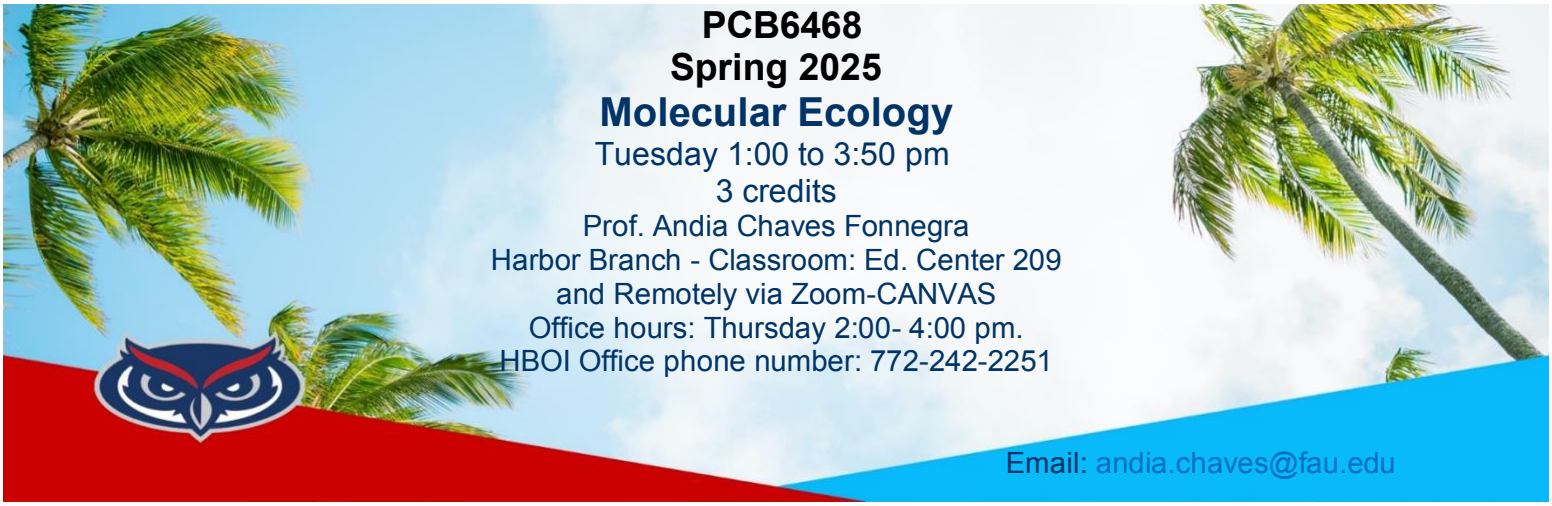
List textbook information in syllabus or here
The Syllabus is below this form. Also, 2024 SPOT for this course (taught as a Graduate Special Topics Course in Spring 2024) is included. The course has been taught four times as a Special Topics Course.

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 Sarah L. Hutton	9-24-24
College Curriculum Chair	9/23/2024
College Dean	09/24/2024
UGPC Chair	
UGC Chair	
Graduate College Dean	
UFS President	
Provost	

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.



Office	WHC SR 234/ HBOI Lab1-137
Office hours	Wed 2:00-4:00 pm
Classroom	Ed. Center 209 and via Zoom
Lab in person sessions	HBOI Lab 1- 110
Telephone	561-860-7098
Email	andia.chaves@fau.edu

Course Description

This is a graduate 6000-level course in molecular ecology that focuses on characterizing individuals, populations, and species through molecular variation (DNA). It includes theory and laboratory (hands-on and computer labs) sections and provides the basis for DNA analyses in any living organism. Molecular markers and full genomes will be used for phylogenetics and microbiome analyses, quantify genetic structure and inbreeding in populations, and characterize new species and virus variants.

One of the objectives of this course is to facilitate critical thinking and debate around topics, theories, and concepts where disagreement is not only anticipated, but encouraged. The ability to think critically, express your ideas clearly, and respond to the professor and other students civilly are the keystones of the academic experience. In this course, the professor will provide instruction in an objective manner and will remain open to a wide variety of viewpoints, so long as those viewpoints are evidence-based and presented in a respectful way. During class, the professor may take positions and make statements for the sole purpose of accomplishing an academic objective or enhancing the learning environment. Additionally, the adoption of class materials for this course does not imply an endorsement of the full content of those materials or the positions of the authors of those materials. Often the professor will provide materials as a point of departure for critical thinking and debate. Students should keep in mind that the ideas presented or discussed during class may not necessarily reflect the professor's personal beliefs or opinions on the subject matter.

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 students practical hands-on experience with most of the techniques covered in the lecture portion of the course. All students must attend two lab sessions in-person at the HBOI campus (at the beginning of the course). Students in other campuses can attend the rest of the course online - via Zoom.

Prerequisites/Corequisites

None.

Course Objectives/Student Learning Outcomes

At end of course, students will be able to

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

Course Evaluation Method

The grade in the course will be based on a series of weekly assignments (70%), paper discussions (10%), and a final project (20%). Graduate students will receive datasets to perform various analyses including statistical computations, searches in GenBank, phylogenetic analyses. **As a 6000-level course, students are required to summarize, contrast, and critically discuss lab results with other published research in their assignments.** The topics of the presentations will be defined based on students' interests, but will be within the following research areas:

1. Wildlife forensics.
2. Infectious diseases - COVID19 variants.
3. Aquaculture/Overfishing.
4. Environmental Change.
5. Population Genetics
6. Microbiome/Metabarcoding
7. Pangenomics

The final project will follow the guidelines for a Nature journal contribution:
https://www.nature.com/nature/for-authors/formatting-guide

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)

The course is taught in-person at FAU-HBOI campus with live remote option and recorded lectures (via Zoom on CANVAS). **Students on other campuses are required to attend only two classes in person at HBOI; they can attend all other classes via Zoom.**

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

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 (if applicable)

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
MEGA https://www.megasoftware.net/
Geneious https://www.geneious.com/
Microsoft Excel
R and R studio https://rstudio-education.github.io/hopr/starting.html
UNIX -Python Through FAU KoKo 3 desktop - https://helpdesk.fau.edu/TDClient/2061/Portal/KB/ArticleDet?ID=141467

Course Topical Outline

NOTE: This schedule is subject to change

		Lectures (~ 1 hour)	Lab (~ 1h and 50 min)
Date	**Week**		
Jan/07	1	**Lecture** Introduction -Applications of Molecular Data (DNA) to ecological studies.	**Lecture** - Genetic Markers in Nuclear and Mitochondrial Genomes I.
Jan/14	2	Lab DNA extraction **in-person HBOI-Lab1- 110**	Lab DNA quantification and electrophoresis **in-person HBOI-Lab1- 110**
Jan/21	3	**Lecture** - Genetic Markers in Nuclear and Mitochondrial genomes. PCR II.	Lab PCR– COI **in-person HBOI-Lab1- 110**
Jan/28	4	**Lecture** Aspects that influence genetic diversity- From the Neutral Theory to new theories.	**Computer Lab** – Assembly of Sequences- **Geneious**
Feb/04	5	**Lecture** - DNA Sequencing	**Lab- Sequencer demonstration**
Feb/11	6	**Lecture** - COVID19 Genome	**Computer Lab MEGA**- Barcoding COVID Phylogenetics, GenBank
Feb/18	7	**Intro to R and R Studio**	**Intro to R and R Studio**
Feb/25	8	**Lecture** - Relatedness and Paternity- Parentage Analysis -Inbreeding (Lecture)	**Parentage Assignment in R**
Mar/04	9	Spring Break	Spring Break
Mar/11	10	**Lecture** - UNIX and Pangenomics	**UNIX-Environment**
Mar/18	11	**Lecture** - UNIX and Pangenomics	**Pangenomics**
Mar/25	12	**Lecture** - Microbiome and Metabarcoding	**Microbiome Analyses in R**
Apr/01	13	**Lecture** - Single Population- Genetic Diversity- Hardy-Weinberg Equilibrium	**Pop Gen in R - Pop structure, networks, AMOVA and DAPC**

		Single pop (pop subdivision, gene flow, F statistics) I	**in R**
Apr/08	14	**Lecture** - Multiple Populations (statistical testing, genetic distance, and bottlenecks) II	**Pop Gen in R – Full Genome-Genotyping by Sequencing** **K-means clustering in R** **Final Projects assigned**
Apr/15	15	**Paper presentation - Students**	**Paper presentation - Students**
Apr/22	16	**Final Project due**	Write the final project following the guidelines for a Nature journal contribution https://www.nature.com/nature/for-authors/formatting-guide

FAU FLORIDA ATLANTIC UNIVERSITY SPOT - STUDENT PERCEPTION OF TEACHING

Instructor Evaluation

SEMESTER:	Spring 2024	**COURSE/ SECT/CRN:**	BSC6936 008 16385
TITLE:	Molecular Ecology	**CAMPUS:**	Harbor Branch
INSTRUCTOR:	Chaves Fonnegra, Andia	**NUMBER ENROLLED:**	14
COLLEGE:	C.E. Schmidt Coll of Science	**NUMBER RESPONDED:**	14
DEPARTMENT:	Biological Sciences	**PERCENT RESPONDED:**	100.00

THE INSTRUCTOR:	COMPLETELY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	COMPLETELY DISAGREE	NO RESPONSE	MEAN
1. Covered what was stated in the course objectives.	100.00	.00	.00	.00	.00	1.00
2. Communicated ideas effectively.	92.90	7.10	.00	.00	.00	1.07
3. Gave useful feedback on coursework.	78.60	21.40	.00	.00	.00	1.21
4. Encouraged students to think critically.	92.90	7.10	.00	.00	.00	1.07
5. Showed respect for students.	100.00	.00	.00	.00	.00	1.00

	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	NO RESPONSE	MEAN
6. Rate your instructor's overall teaching effectiveness in this course.	85.70	14.30	.00	.00	.00	.00	1.14

Florida Atlantic University
Student Perception of Teaching - Instructor Comments Report
Spring 2024

College: SC - C.E. Schmidt Coll of Science
Department: Biological Sciences
Instructor: Chaves Fonnegra, Andia

Title: Molecular Ecology
Course: BSC6936 Section: 008 CRN: 16385

Student Responses

What did you like most about this course?

My favorite thing about this course is the way Andia taught it. I liked how encouraging Andia from the beginning to the end of the course. She consistently encouraged us to keep going and just try our best. I loved how the class was both undergraduates and graduates. I never would have meet the students I did if she didn't mix the two. Additionally, the class was extremely accommodating as you could join in person or virtually. My favorite thing about the course however was going to the lab and be hands on.

I liked the overall structure of the course. The lab component at the beginning fed nicely into a more technical coding compenent, but I felt the whole course did nicely at showing average processes that you would use in molecular ecology. Lectures were interesting and engaging, well prepared, and flowed nicely. For projects, it was obvious that Professor Chavez-Fonnegra took each students individual research and interests into account when assigning topics. It felt like she genuinely cared about us learning.

I enjoyed the set up that she presented for us throughout the course. She made it extremely attainable and really tried to give you the information in different ways so depending on how the students learned, you were ale to grasp all the concepts. I thought this was one of the best classes I have ever taken including my entire undergraduate career. I think that her dedication to helping students learn was really what made this class great and that she was excellent teacher. Learning the in and out of different DNA programs was also one of my highlights and it was nice that she would help you step by step when you had questions.

I enjoyed how thorough Dr Chaves was.

Her encouragement and helpfulness.

How could this course be improved?

This course was great! Its hard to think of improvements. It can be easy to get bogged down in the R-coding in the end, but I think its an important skill in the field.

Provide laptops to students at the beginning of the semester and/or when coding begins. Spend more time explaining how to navigate Rstudio. Make the final project less dependent on R and more conceptual based.

no comment

I thought that this class was really well put together and wouldn't change anything about it.

Background introductions/lessons to subjects being taught to catch students up first.

Additional Comments and suggestions.

Wonderful professor, just felt out of touch with some lectures and had to do own catch up on subjects to understand the more technical nature of what was being taught.

Thanks!

It was a great class, both challenging but stimulating :)

Florida Atlantic University
Student Perception of Teaching - Instructor Comments Report
Spring 2024

College: SC - C.E. Schmidt Coll of Science
Department: Biological Sciences
Instructor: Chaves Fonnegra, Andia

Title: Molecular Ecology
Course: BSC6936 Section: 008 CRN: 16385

Student Responses

Dr. Andia is a great teacher and I am so glad I was able to be apart of this class and learn so many new DNA techniques. I think you should allow this course to be on the masters program selected courses instead of using this as a special topics. This would allow for students to partake in this class and would be beneficial for a lot of masters students and there thesis.

Domain: SPOT - Student Perception Of Teaching
Fex: SWRTES46 - SPOT Instructor Comments sent via email