

**Course Number and Title**

ZOO6927, Class # 28028, Section 924C. Fall 2021: Special Topics, Adaptive Dynamics.

**Catalog Description**

This is an advanced undergraduate and graduate level weekly 2-hour seminar in the concepts and tools for the adaptive dynamics framework for studying evolutionary change in biological populations. It is a very specialized topic in theoretical ecology and evolution. The course focuses on learning the demographic and selective processes that are inherent in the adaptive dynamics framework and making connections between the frameworks of adaptive dynamics and other models of evolutionary dynamics.

**Credit Hours**

2 credit hours

**Pre-requisites and Co-requisites**

MAC2312 & STA2023

(Calculus II or its equivalent) & (Intro to statistics I or its equivalent)

STA4321 is highly desirable but NOT required

MAS4105 is highly desirable but NOT required

A first course in stochastic processes is highly desirable but NOT required.

**Course Objectives**

- Explain and apply basic and fundamental concepts of Adaptive Dynamics to simple biological scenarios
- Identify and discuss the advantages and disadvantages of “Adaptive Dynamics” as a framework to study the evolution of ecological dynamics.
- Employ basic elements of mathematical statistics, probability and stochastic processes to understand the origins and the probabilistic elements of “Adaptive Dynamics” as a discipline.
- Identify future research directions in “Adaptive Dynamics”.

**Instructors Information**

Name: Nicholas Kortessis, Robert D. Holt and José Miguel Ponciano

Office location: Carr Hall 309 and 309A

Telephone: (352)-392-2784

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Office hours: by appointment, Carr 309 or Friday mornings between 9:30-12:00

**Course Meeting Time(s)**

W | Periods 6-7 (12:50 AM – 2:45 AM)

**Course Meeting Location(s)**

Meetings face to face at CARR HALL 222

## Recommended Materials

### Textbooks or Other Readings (Not required)

- Doebeli, M. 2011. Adaptive Diversification.\*  
Dercole, F. and S. Rinadli. 2008. Analysis of Evolutionary Processes.\*  
Rice 1995. Mathematical Statistics.  
Pielou, E.C. 1969. An introduction to mathematical ecology  
Boswell, M.T., Ord, J.K. and G.P. Patil. 1979. Chance mechanisms underlying univariate distributions. In “Statistical Distributions in Ecological Work”, pp 3-156. International Cooperative Publishing House.  
Ewens, W. 2004. Mathematical Population Genetics 1- Theoretical Introduction. Springer Verlag.

\*Available as e-books at the University of Florida library.

## Readings

### Required:

## Course Website

Course materials and related information will be posted on the course E-Learning website at <http://lss.at.ufl.edu>. You are responsible for all announcements made in class and/or posted on the course website for this course.

## Software (Required)

R, freely distributed at <http://www.r-project.org>

### Course Outline (topics covered by week or by class period)

Week	Topic
1	Review of evolutionary forces: mutation, selection, demography Review of major questions in evolutionary biology
2	Comparing the major frameworks for modeling evolutionary change
3	Introduction and overview of stochastic processes
4	Deriving the canonical equation of adaptive dynamics 1: A stochastic perspective on mutation, demography, and selection
5	Deriving the canonical equation of adaptive dynamics 2: Going from stochastic to deterministic perspectives
6	Invasion fitness, resident and invader strategies, trait substitution
7	Stability concepts: evolutionary stability, convergence stability, and evolutionary branching.
8	Dynamics beyond equilibrium: coevolutionary dynamics, (co)evolutionary cycles, evolutionary slowing down, and chaotic evolutionary dynamics
9	Adaptive Dynamics for competitive interactions
10	Adaptive Dynamics for exploiter-victim interactions
11	Adaptive Dynamics for cooperative interactions
12	The limits of Adaptive Dynamics: criticisms, critiques, and omissions
13	Reversing the assumption of separation of timescales: fast evolutionary dynamics and slow ecological dynamics for host-parasite, host-pathogen, and microbial dynamics.

14	Special topics in Adaptive Dynamics: Multi-dimensional traits, function-valued traits, evolutionary suicide, temporally and spatially heterogeneous environment
15	The future of adaptive dynamics

**University policy and resources**

<b>College Policy on Zoom Presence</b>
<p>University policy gives students the right to opt out of audio and video participation in classroom Zoom sessions that are being recorded. Also, in non-recorded classroom Zoom sessions, it is best practice not to require students to have their camera and audio on, since they may face a number of challenges – technical or otherwise – that make this kind of participation difficult or undesirable. For this reason, instructors should consider allowing alternative forms of participation, such as chat and blog entries or, when necessary, audio-only presence. In the rare case where an instructor deems both audio and video participation to be necessary (as in foreign language classrooms), this must be approved by the unit chair/director and by the college, and this requirement must be explicitly disclosed in the course syllabus.</p>

<b>Mask Policy</b>
<p>Masks are optional at UF. However, masks are always acceptable for those who wish to wear them. The CDC recommends that those not fully vaccinated for COVID-19 continue to wear masks, particularly indoors; and even those who are fully vaccinated may choose to wear masks for a variety of reasons. Thank you for supporting your fellow Gators as they balance health, comfort, and other considerations in their decision to wear or not to wear a mask.</p>

<b>In Class Recording Policy</b>
<p>Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.</p> <p>A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.</p> <p>Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium,</p>

to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### Grading

- Four sets of Homework problems involving pencil and paper calculations and some programming: 60% of final grade
- Class Participation: 30 % of final grade

### Grading Scale

Point Range (%)	Letter Grade	GPA equivalent
≥ 90.00	A	4.0
86.7 – 89.9	A-	3.67
83.3 – 86.6	B+	3.33
80.0 – 83.2	B	3.0
76.7 – 79.9	B-	2.67
73.3 – 76.6	C+	2.33
70.0 – 73.2	C	2.0
66.7 – 69.9	C-	1.67
63.3 – 66.6	D+	1.33
60.0 – 56.7	D	1.0
56.7 – 59.9	D-	0.67
< 56.7	E	0

Note that a “C-“ will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better).

Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>

### Grade Curve Policy

No grading curve

### Attendance and make-ups

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

If you are experiencing COVID-19 symptoms ([click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#). Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time

to make up work. Refer to the above link for more information on the university's attendance policy.

### **Accommodations**

Students who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### **Course Evaluations**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.aa.ufl.edu/students/](http://gatorevals.aa.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.aa.ufl.edu/public-results/](http://gatorevals.aa.ufl.edu/public-results/).

### **Academic Integrity**

“UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honorcode/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class. Each student is responsible for reviewing and adhering to the UF Student Honor Code: <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>. If you witness any instances of academic dishonesty, please notify your instructor, TA, or the Dean of Students Office (352-392-1261). **I encourage students to work together and to help one another master the material.** You can collect data together, help each other in the field, discuss ideas, practice presentations in front of one another, make up practice exams, critique drafts of each other's reports, etc. Despite this "group learning", the final product that you turn in for grading must reflect your own work. Any contribution from another individual must be credited (e.g., include an acknowledgement section that says "I thank person X and person Y for their helpful comments on a previous draft, and person Z for providing insights about differential equations.").

### **Resources Available to Students**

#### **Health and Wellness**

- *U Matter, We Care*: [umatter@ufl.edu](mailto:umatter@ufl.edu); 392-1575. Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out

to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

- *Counseling and Wellness Center*: <http://www.counseling.ufl.edu/cwc/Default.aspx>; 392-1575
- *Sexual Assault Recovery Services (SARS)*: Student Health Care Center; 392-1161
- *University Police Department*: <http://www.police.ufl.edu/>; 392-1111 (911 for emergencies)

### ***Academic Resources***

- *E-learning technical support*: [Learningsupport@ufl.edu](mailto:Learningsupport@ufl.edu); <https://lss.at.ufl.edu/help.shtml>; 352-392-4357 (opt. 2)
- *Career Resource Center*: Reitz Union; <http://www.crc.ufl.edu/>; 392-1601
- *Library Support*: <http://cms.uflib.ufl.edu/ask>
- *Teaching Center*: Broward Hall; 392-2010 or 392-6420
- *Writing Studio*: 302 Tigert Hall; <http://writing.ufl.edu/writing-studio/>; 846-1138
- **Accommodations for Students with Disabilities**
  - Students who require accommodations for a disability must contact the UF Disability Resource Center (<https://www.dso.ufl.edu/drc>) to request an Accommodation Letter. No accommodations are available to students until the letter is provided to the instructor. Once your instructor receives your letter, your instructor and TA will be happy to work with you to arrange the necessary accommodations.

### ***Procedure for Conflict Resolution***

Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact the (Under)Graduate Coordinator or the Department Chair. Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (<http://www.ombuds.ufl.edu>; 392-1308) or the Dean of Students Office (<http://www.dso.ufl.edu>; 392-1261). For further information refer to [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf) (for residential classes) or <http://www.distance.ufl.edu/student-complaintprocess> (for online classes).

### ***Software use***

All faculty, staff and student of the University are required and expected to obey laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.