Syllabus

Course title (number)
Conservation Biology (PCB 6045), 3 credits

Prerequisites
Graduate student status

Course logistics
- Term: Fall 2019
- Location: BU 411
- Class time: Wed 1:00-3:50

Instructor
- Dr. Dale Gawlik
- Contact information : Sanson Science 220, dgawlik@fau.edu, 297-3333 http://www.science.fau.edu/biology/gawliklab/, http://www.science.fau.edu/biology/envirosci/
- Office hours: Wednesdays 10:00-1:00 and other times by appointment. Because occasional conflicts with office hours arise, students should email the instructor in advance to confirm their visit.

Required text
There is no required text for this course. The instructor will post in Canvas assigned readings drawn from the primary literature as well as select material pulled from *Conservation Biology For All* (Sodhi and Ehrlich, eds, 2010, Oxford Univ. Press). If students are seeking to have a graduate-level reference text book on Conservation Biology, I recommend Principles of Conservation Biology. 2006. M. J. Groom, G. K. Meffe, C. R. Carroll, and contributors. Third edition. Sinauer Associates, Inc., Sunderland, MA.

Online resource
The course will rely primarily on Canvas (for PCB 6045) for exchange of course materials and for communication. Students should check the site often. The web site contains the syllabus, assigned reading, and useful links. It also offers students the opportunity to monitor their grades at any time. Students may also choose to become familiar with the resources available on the web site of the Society for Conservation Biology (https://conbio.org/).

Course objectives
The objectives of this course are to familiarize students with the primary threats to biodiversity and for students to apply contemporary tools to solve conservation problems. Students who compete the course will possess:

1. An understanding of the difference between conservation biology and other ecological disciplines.
2. The ability to recall patterns of biodiversity including its many hierarchical levels.
3. A good understanding of the processes driving populations, communities, and ecosystems.
4. The ability to discern the primary threats to biodiversity.

5. The expertise to distinguish among the best approaches for conserving biological diversity and some of the contemporary tools.
6. A clear notion of how society shapes conservation efforts, including the forces of economics, policy, ethics, and institutions.

Course description

The course will be taught with mix of active and passive teaching techniques. Passive techniques include listing to lectures and reading assigned papers. *Lectures* will focus on selected concepts from the conservation biology literature, often illustrated with first-hand experiences of the instructor and supported by assigned readings from the primary literature. Active teaching elements of the course include a major *team project* that uses a contemporary tool for conservation biology, *journal article discussions*, *field trips*, and *discussions with guest lecturers* from practitioners of conservation biology.

Class project: Because of the multidisciplinary nature of conservation biology, it is most often practiced in a team setting, as are other emerging ecological disciplines like ecosystem management and restoration ecology. Students that hone teamwork skills in this course will be more comfortable with that approach later in their careers. Students in this class will work as part of a team on a major class project that could have implications for conservation. This year the class will focus on the use of formal *meta-analyses* in conservation. Although the use of meta-analyses in the ecological/conservation sciences goes back to the mid-1990s, only recently has it become prevalent. Meta-analyses were initially restricted to experiments but are now being applied to a wider range of study designs. This trend will almost certainly increase as our discipline grapples with large-scale conservation problems that cannot be addressed at a single site or over short time periods. Despite the outsized importance that meta-analyses will likely take on in the future, these techniques are not covered in traditional statistics classes. The goals of the class project will therefore be to: (1) identify a conservation question that is ripe for a synthesis, (2) successfully conduct a formal meta-analysis on existing literature, and (3) write up a manuscript that answers the question. The steps to complete the group project are as follows:

1. The project will begin with an instructor-led discussion of a foundation paper (Gurevitch et al. 2018) on the use of meta-analyses on week 2 of class. Students will need to read further and additional literature will be recommended. Although the first few steps of this project will be conducted by the class as a whole, students should begin to form teams consisting of 4 people per team.
2. Collectively, the class will then decide on a single conservation question that is ripe for a systematic review. **This is probably the most important step in the entire process because it will define your pool of literature (i.e., your sample population)**. There must be enough literature to provide an adequate sample size and the prevailing view of the question should have some degree of uncertainty or variation. Examples of questions might be: to what degree does predator control affect nesting success in taxa X, or what is the effectiveness of invasive species control technique X, or what effect does food supplementation have on reproductive parameter X for taxa X? It is always the case that some studies that might seem suitable at first glance will not meet the criteria for inclusion into your analysis. Meta-analyses were originally used to analyze the results of experiments rather than field studies. Although that has changed in recent years,

experiments are still the most straight-forward types of studies to analyze. **The selection of a research question should be done in consultation with the instructor.**

3. The class will collectively decide on a set of criteria for inclusion into the population to be analyzed and will conduct the steps in the PRISMA process to determine which studies will be analyzed in the meta-analysis.
4. Analyses of data will be conducted by the class collectively or by a designated subset of the class who have strong quantitative skills, preferable experience using mixed models or generalized linear models. The analysis will be conducted using one of the free software programs commonly used for meta-analyses. If someone is fluent in the program R then you may choose to use the most common and powerful free meta-analysis software, package metafor in R. If no one is fluent in R, then other programs are available as macros in Excel or in other customized freeware. Each has limitations and strengths so selection of the program will affect the final analysis to some degree. **The choice of a software program should be done in consultation with the instructor**.
5. At this point the class has a common question, they have selected a population of studies, and they have analyzed the data collectively and have shared results. However, from here onward, each team will interpret the analyses separately and write up their interpretation in a concise manuscript formatted for the journal Conservation Biology.
6. Finally, each team will give a 30-min presentation on the results of their project.

Project components to be evaluated consist of (1) brief oral progress presentations and associated PowerPoint slides, (2) a final manuscript, (3) final presentation, and (4) team-member peer evaluations. There will be 3 class oral progress presentations, each one led by a different subset of students. Thus, each student regardless of team membership should participate in one oral progress presentation. Each team will produce their unique manuscript and final presentation. Each student must evaluate each of their team members, but not all students in class, to receive their own participation points.

Project components to be evaluated:

1. *Oral progress presentation and pptx on research question (~10 min).* The brief update should give the background and overview of the conservation research question that is being tested and why a meta-analysis is well-suited to address it. Include a summary of the various published results to show that there is some variation and uncertainty in responses. Also include a rough estimate of the number of papers on this topic.
2. *Oral progress presentation and pptx on steps in the PRISMA flow diagram (~10 min).* The PRISMA flow diagram is simply a graphical depiction of the steps used to identify the data to be included in a meta-analysis. These steps are outlined in the first journal article discussion (Gurevitch et al. 2018). The presentation should list progress and results in each step of the flow diagram including the data sources that will be used to identify papers and the rules and criteria that will the basis for screening. The presentation should also include the software to be used to conduct the analysis and the reason it was chosen.
3. *Oral progress presentation and pptx on preliminary results (~10 min).* The presentation should be the results of the analysis in the context of the original question. It might be useful to produce some of the figures that are common in meta-analysis papers and that will be needed later in the manuscript.

4. *Manuscript from final project.* Each team will produce an original manuscript that describes the project and meaning of the results formatted as a "Contributed Paper" for the journal Conservation Biology. The content of the report will introduce the original question and the uncertainty and variability in the various published papers and make the case that a synthesis is needed. When discussing any policy implications, think broadly considering global trends. **Follow precisely the "Author Guidelines" including the length limit**. The data used in the project should be included as an appendix.
5. *Oral presentation on the final project (30 min).* This presentation is a summary of the final project manuscript. Each member of the team should contribute to the presentation. A copy of the slides must be provided to the instructor no later than the morning of the oral presentation.
6. *Peer team participation scores.* Each team member will submit an email to the Professor scoring each of their team member's contribution to the entire project out of a total of 10 points. The email should also contain a few sentences of text justifying the scores. Each student's participation score will simply be the mean of the scores they received from their peers. Students must submit scores to receive a score.

Project grades for each student will be based on the quality of their oral presentations (1, 2, or 3 and 5 above), final manuscript (4), and their mean peer team participation score (6). Oral presentations will be graded for their overall content, graphics, and effectiveness in conveying the material. Individual presenters will also be graded on their effectiveness as a presenter following rubric in O'Donnell (2007) which is posted on Canvas.

Journal article discussions: The purpose of the journal article discussions is to get students reading the most current conservation biology literature, allow students to hone their reading and critical evaluation skills, and expose students to the most recent literature in topics we are studying. Students working in teams of 4 people will lead one class discussion on a recent scientific journal article drawn from a set provided by the instructor on topics that will be covered in class or drawn from an independent literature search by the students on a relevant topic. A pdf of the article should be posted in Canvas by a team member one week prior to the discussion. Teams should focus on the scientific approach, major results, significance, and overall strengths and weaknesses. Students will be graded individually on how well they foster and stimulate discussion.

Field trips: The class will participate in an all-day (and long day) field trip to Everglades National Park, which students often say is the highlight of the course. Everglades National Park is the country's most endangered National Park and one of its most unique natural areas and it is rich with applications of conservation biology, ranging from the genetic rescue of the Florida Panther to invasive plant management. The field trip is an opportunity to see conservation biology in practice. Plan to get wet. The date of the field trip will likely be Saturday, November 16 pending any major conflicts such as a conference.

There will also be a field trip to A.R.M. Loxahatchee National Wildlife Refuge in Boynton Beach. Here we will tour the LILA research facility, a novel experimental facility operated by the South Florida Water Management District that addresses critical Everglades restoration questions. As with the National Park trip, plan to get wet. This trip will occur during our regular

class period on Sep 25. Note that we will meet at the Refuge Visitor Center at 1:00. Transportation is on your own but car-pooling is encouraged.

Guest Lectures: Practitioners of conservation biology will provide the class with a lecture in their areas of expertise as well as some informal discussion after class at the Burrow. I strongly encourage students to visit with the speaker after class if schedules allow it. These discussions have provided students with useful feedback on their individual projects and sometimes initiated the acquaintance with a new professional contact in their field of study. This year's speakers are Dr. Stefani Romanach from the US Geological Survey, and 2 other local practitioners of conservation biology.

Class participation: Active teaching techniques rely heavily on student participation in journal article and class discussions and for the team project. Student participation will be fostered, valued, and accounted for in final grades. Maximum participation points are earned from discussions with speakers, daily comments in class, and discussions on the field trips. **Low participation in any of these areas will result in fewer participation points.**

Exams
There will be one mid-term exam and one final exam. Both will be short answer format. The final exam **will not** be comprehensive. Make up exams will be given for excused absences as described in the University Catalog under Attendance Policy. Makeup exams will be given within a week of the missed exam. The instructor should be notified of a missed exam prior to the absence. The instructor must be notified within 24 hours of the missed exam period to avoid the test grade being recorded as a 0. Exams will cover lecture material, assigned readings, journal article discussions, guest speaker lectures, and field trips.

Course Evaluation
Grades will be based on a student's performance on 10 course components, with each component accounting for a percentage of the grade as follows:

Course component	**Max points**	**% of Grade**
Class project		
Oral progress presentation and pptx	10	2.5
Final oral presentation	40	10
Manuscript	100	25
Peer team participation score	10	2.5
Mid-term exam	100	25
Final exam	100	25
Class participation	20	5
Journal article discussion	20	5
Total	400	100

Course Grading Scale
Final percentages will be converted to letter grades as below. Grades may be viewed through Canvas.

Grade	**Final Percentage**
A+	99-100

A	92-98
A-	90-91
B+	88-89
B	82-87
B-	80-81
C+	78-79
C	72-77
C-	70-71
D+	68-69
D	62-67
D-	60-61
F	<60

Course topical outline (see Canvas calendar for updates). The schedule of topics to be discussed is subject to change during the semester, depending on the needs of the class; however, the exam dates are firm. Dates with assignments due are shaded and in bold.

Date	**Course activity/topic**	**Assignment**
Aug 21	Syllabus review; lecture - biodiversity patterns and environmental ethics	Read journal article, team project
Aug 28	Lecture – biodiversity threats; journal article discussion (Meta-analysis – Gawlik)	Read journal article, team project
Sep 4	Lecture; journal article discussion	Team project
Sep 11	**Oral progress presentation**; *guest speaker*	Read journal article, **pptx due**
Sep 18	Lecture (Dr. Colin Hughes); journal article discussion	Read background paper on LILA, team project
Sep 25	*Field trip, Loxahatchee NWR*	
Oct 2	Lecture; **Oral progress presentation**	Team project, **pptx due,** mid-term exam preparation
Oct 9	**Mid-term exam**	
Oct 16	Lecture; **oral progress presentation**	Read journal article, team project, **pptx due**
Oct 23	Journal article discussion; lecture	Read journal article, team project
Oct 30	Journal article discussion; lecture	Team project
Nov 6	Lecture, *guest speaker*	Team project
Nov 13	Lecture, *guest speaker*	Team project
Nov 16 Saturday	*Field Trip Everglades National Park*	Team project
Nov 20	**Final oral presentations and pptx**	Team project, **pptx due**
Dec 4	Reading Day	**(**Manuscript due**) (**Peer team participation scores due**)**
Dec 11	**Final exam 1:15-3:45**	

Time requirements
Students who want to do well in the course should expect to spend an average of 6 hours per week outside of class completing the assignments above, plus one full day on a field trip to ENP. The team project is a substantial time commitment that requires continual progress so students should allocate time for their project each week.

FAU Attendance Policy Statement
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.

FAU 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.
http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf

FAU 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/.

FAU 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/.