CALS Curriculum Committee Meeting
August 17, 2018
2:00 p.m.
1044 McCarty Hall D

Members: R. Baldwin, J. Brendemuhl, J.C. Bunch, T. Frazer, D. Gabriel, P. Inglett, S. Johnson, B. Kolaczkowski, A. Mathews, G. Nunez, B. Pearson, W. Porter, C. Prince, K. Rose, D. Rowland, S. Sager (Chair), M. Sharp, C. Stefanou, L. Warren, A. Wysocki

Agenda and Index for Materials

Approve Minutes from April 13, 2018 meeting

Dr. Brendemuhl: Update from UCC

Graduate New Course Proposals

1. ENY 6XXX – Ecology and Conservation of Pollinators (req. #12773)

2. FAS 5XXX – Invasion Ecology of Aquatic Animals (req. #12896)

3. FAS 6XXX – Environmental Physiology of Fishes (req. #12895)

4. FAS 6XXX – Spatial Sciences for Marine Environmental Characterization (req. #12897)

5. FAS 6XXX – Fisheries Enhancement (req. #12900)

6. SWS 5XXX – Aquatic Toxicology: Science and Applications (req. #12689)

Graduate Course Change Proposals

7. AEC 6933 – Seminar in Agricultural Education and Communication (req. #12781)

8. WIS 6934 – Topics in Wildlife and Range Sciences (req. #12511)

Undergraduate New Course Proposals

9. ENY 4XXX – Ecology and Conservation of Pollinators (req. #12772)

10. FYC 4XXX – Family and Cultural Diversity (req. #12849)

11. SWS 4XXX – Aquatic Toxicology: Science and Applications (req. #12688)

Certificates

12. Graduate Certificate in Environmental Microbiology (req. #12418)

13. Graduate Certificate in Environmental Education and Communication (req. #12164)
Item previously approved as submitted by CALS CC. Item was recycled by the Graduate Curriculum Committee for further discussion.

Recycled items

14. Proposed name change to Interdisciplinary Studies Concentration in Environmental Management in Agriculture and Natural Resources (req. #11996)
Item recycled on 11/17/2017. Comments as follows: A motion was made by Dr. Johnson to recycle this item back to the department for additional material and resubmission. The motion was approved. Outside consultations are requested from the School of Forest Resources and Conservation, Environmental Engineering, and the College of Design, Construction and Planning to assure there are no conflicts with any existing programs. It was also suggested to include a letter from UF Online explaining the need for a shorter title.

15. MCB 4XXX – Microbial Applications of Synthetic Biology (req. #11708)
Item recycled on 1/12/2018 and 4/13/2018. MCB 6XXX co-taught course not submitted at this time. Comments as follows: 1/12/2018 - This item was reviewed with item #6. Comments apply to both submissions unless otherwise stated.

A motion was made by Dr. Kolaczkowski to recycle these items back to the department for required updates and resubmission. The motion was approved. A reading list needs to be included on the UCC form and Syllabus for the graduate submission. The three page difference required for the graduate research proposal versus the one for undergraduates is not a sufficient enough gap in rigor for the graduate students. The course objectives for the graduate course cannot mirror those of the undergraduate course. Some of them can be the same, but the others must reflect the differences expected for graduate students. Also, the syllabus must contain information showing the difference in rigor for the graduate students as opposed to the undergrads. It was suggested that you attach a separate document to the submission explaining these differences. This will help further along in the approval process and can be included in the syllabuses. There should be only one course number on each syllabus. The course description on the UCC form must match the description on the syllabus. The prerequisite requirement in each syllabus needs to match the one on the UCC form. Use only the courses required. Additional wording cannot be enforced by the prerequisite checker. Based on the information provided it is not clear if this course is synchronous or asynchronous. There needs to be more specific information in both syllabuses regarding the quizzes, discussions and homework assignments.
4/13/2018 - Previously submitted 1/12/2018 – Reviewed with item #8

A motion was made by Dr. Johnson to recycle these items for required updates and resubmission. The motion was approved. The reading list for the graduate course needs to be included on the UCC1 form. The committee feels there are still not enough differences in rigor between the graduate and undergraduate courses. Normally the graduate course would have 15-20% of the student's assessments that are unique from the undergraduate student. This can be accomplished by having unique exam/quiz questions for graduate students, assignments that are unique to graduate students, etc. The objectives for the graduate student should also be somewhat different than those for the undergraduate student. The course number at the top of each syllabus should be MCB 6XXX and MCB 4XXX.

16. HOS 3XXX – Medicinal Plant and Herb Production (req. #12481)
Item recycled 4/13/2018. Comments as follows: A motion was made by Dr. Kolaczkowski to recycle this item back to the department for required updates and resubmission. The motion was approved. To ensure there is no excessive overlap with any existing courses the committee requires outside consultation forms from Environmental Horticulture, Biology (Botany), and Food Science and Human Nutrition. The proposed course (3000 level) requires a prerequisite. If there is no appropriate prerequisite the proposal could be changed to a 2000 level course. For the course to be proposed with a "C" designation there needs to be a greater explanation of lab activities.

CALS Curriculum Committee Meeting
April 13, 2018
Submitted by James Fant

Members Present: T. Andenoro, R. Baldwin, J. Brendemuhl, D. Gabriel, P. Inglett, S. Johnson, B. Kolaczkowski, A. Mathews, C. Moss, G. Nunez, W. Porter, D. Pracht, D. Rowland, A. Warner, L. Warren, S. Wilson

Visitors: Andrea Lucky and Nicole Stedman

Call to Order: The College of Agricultural and Life Sciences Curriculum Committee met on April 13, 2018 in Rm. 1044 McCarty Hall D. Dr. Tony Andenoro called the meeting to order at 2:04 p.m.

Previous agenda items and supporting material can be found on the CALS Curriculum Committee homepage under archived information:
http://www.cals.ufl.edu/faculty_staff/curriculum_committee.shtml

Approval of Minutes: A motion was made by Dr. Johnson to approve the minutes from the March 16, 2018 meeting of the CALS CC. The motion was approved.

All items approved by the committee will be forwarded to either the Graduate Curriculum Committee (GCC), Graduate Council (GC) or the University Curriculum Committee (UCC) once any changes requested are made and the submission is complete.

Websites: Grades – https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx
Syllabus Statements – http://www.cals.ufl.edu/faculty-staff/docs/policies/CALS%20Syllabus%20Policy%20Final.pdf
Absences & Make-Ups – https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Update from UCC: Dr. Brendemuhl noted that CALS had the following items on the March 20, 2018 agenda: 1) New Undergraduate Certificate – Gateway to Agroecology (recycled); 2) New Undergraduate course – FOS 4XXX-Flavor Chemistry (conditionally-approved); and 3) Proposed changes to an Undergraduate course – MCB 4203-Bacterial and Viral Pathogens (conditionally-approved). The following item will be addressed at the April 17th, 2018 UCC: 1) Proposed change to Undergraduate Certificate – Family Life Educator. Dr. Brendemuhl noted that the release for Quest 1 courses will be out soon and he also indicated that today (April 13th) was the deadline for semester plans for critical-tracking during semesters 6-8 are due. He reminded members concerning trainings associated with various rollouts of UF COMPASS and to stay abreast and take the trainings. He also thanked all the committee members for their service on this year's curriculum committee and bid them an excellent summer recess.

Undergraduate New Course Proposal

1. HOS 3XXX – Medicinal Plant and Herb Production (req. #12481)

A motion was made by Dr. Kolaczkowski to recycle this item back to the department for required updates and resubmission. The motion was approved. To ensure there is no excessive overlap with any existing courses the committee requires outside consultation forms from Environmental Horticulture, Biology (Botany), and Food Science and Human Nutrition. The proposed course (3000 level) requires a prerequisite. If there is no appropriate prerequisite the proposal could be changed to a 2000 level course. For the course to be proposed with a "C" designation there needs to be a greater explanation of lab activities.

2. HOS 4XXX – Genetics and Breeding of Vegetable Crops (req. #11663)

A motion was made by Dr. Johnson to approve this item with updates required. The motion was approved. The reading list needs to include more up-to-date material. The committee is also concerned that there is an excessive amount of reading assignments for the undergraduate students. The attendance and make-up policies, for submission purposes, should only reference the links provided. This will help prevent the submission from held up further in the approval process. Decimal points need to be added to the percentages on the grading scale (ex: 85 – 90.9 = B+, 80 – 84.9 = B, etc.). This will help avoid any confusion on the part of the student. The goals for both the graduate and undergraduate students need to be more defined.

Curriculum

3. Proposed termination of the Entomology and Nematology specialization in Biosecurity (req. #12383)

This item was reviewed with item #5.

4. Proposed termination of the Entomology and Nematology specialization in Ecotourism (req. #12382)

This item was reviewed with item #5.

5. Proposed modification to the Entomology and Nematology specialization in Basic Science (req. #12381) – This item was reviewed with items #3 and #4.

A motion was made by Dr. Porter to approve these items as submitted. The motion was approved. Please review submissions for typing errors.

6. Proposed modification to the Agricultural Education and Communications 8 Semester Plans (req. #12487)

This proposal will have to be denied and two new submissions created. One for each specialization. However, the committee did decide to review the proposal to avoid any delays. A motion was made by Dr. Kolaczkowski to approve the proposed modifications to each specialization as submitted. The motion was approved.

Recycled items

7. MCB 6XXX – Microbial Applications of Synthetic Biology (req. #11709)
Previously submitted 1/12/2018 – Reviewed with item #8

A motion was made by Dr. Johnson to recycle these items for required updates and resubmission. The motion was approved. The reading list for the graduate course needs to be included on the UCC1 form. The committee feels there are still not enough differences in rigor between the graduate and undergraduate courses. Normally the graduate course would have 15-20% of the student's assessments that are unique from the undergraduate student. This can be accomplished by having unique exam/quiz questions for graduate students, assignments that are unique to graduate students, etc. The objectives for the graduate student should also be somewhat different than those for the undergraduate student. The course number at the top of each syllabus should be MCB 6XXX and MCB 4XXX.

8. MCB 4XXX – Microbial Applications of Synthetic Biology (req. #11708)
Previously submitted 1/12/2018 – Reviewed with item #7 (comments above)

The meeting was adjourned at 2:49 p.m.

Cover Sheet: Request 12773

ENY 6XXX Ecology and Conservation of Pollinators

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rachel Mallinger rachel.mallinger@ufl.edu
Created	6/13/2018 1:47:04 PM
Updated	7/18/2018 4:19:37 PM
Description of request	This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Entomology and Nematology 514914000	Heather Mcauslane		7/2/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			7/2/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12773

Info

Request: 6XXX Ecology and Conservation of Pollinators
Description of request: This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.
Submitter: Rachel Mallinger rachel.mallinger@ufl.edu
Created: 7/18/2018 4:24:11 PM
Form version: 4

Responses

Recommended Prefix ENY
Course Level 6
Number XXX
Category of Instruction Joint (Ugrad/Grad)
Lab Code None
Course Title Ecology and Conservation of Pollinators
Transcript Title Eco Cons Pollinator
Degree Type Graduate

Delivery Method(s) On-Campus
Co-Listing Yes
Co-Listing Explanation This course is a joint undergraduate and graduate level course; both graduate and undergraduate students will attend the same on-campus class periods. Graduate students will be expected to do an additional assignment (lead a class discussion on two scientific publications), a more rigorous assignment (longer and more in-depth research paper of 7-8 pages with 10 citations in comparison to 4-5 pages with 3 citations for undergraduate student papers), and additional readings (for research paper and leading discussion).
Effective Term Spring
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.
Prerequisites (BSC 2010(C-) or equivalent) & (BSC 2010 L(C-) or equivalent) & (graduate student standing)
Co-requisites None
Rationale and Placement in Curriculum Currently, there are no graduate courses at UF on pollination ecology and pollinator conservation. These topics have recently received much attention due to concerns over pollinator population declines, honey bee colony losses, and inadequate crop pollination. This course will address this need by focusing on both the ecology of animal pollinators and the plants that they pollinate, as well as pollinator conservation. Graduate students in this course will become familiar with the primary literature in this field, conduct an inquiry-based field research project, and write a scientific manuscript, thereby building their research and communication skills. This course will be offered as an elective within the Entomology & Nematology Department's curriculum
Course Objectives 1. Describe the role of pollinators in both natural and agricultural systems, and the breadth of animal pollinator taxa
2. Explain basic concepts of pollination ecology and relate these concepts to observable phenomena in nature

3. Diagnose factors affecting pollinator populations today, and assess the consequences of pollinator declines for biodiversity and global food production.
4. Analyze, interpret and critique scientific literature
5. Develop and carry out a field-based research project
6. Communicate research in the form of a scientific paper and oral presentation

Course Textbook(s) and/or Other Assigned Reading No textbook is purchased for this course. Readings for the course will be provided to students via the course website.

The following readings will be assigned for discussion, and a few additional readings will be selected by graduate students:

Aguilar-Rodríguez, P.A., G, M., Cristina, M., Krömer, T., García-Franco, J.G., Knauer, A., Kessler, M., 2014. First record of bat-pollination in the species-rich genus Tillandsia (Bromeliaceae). Ann Bot 113, 1047–1055. https://doi.org/10.1093/aob/mcu031

Cakmak, I., Sanderson, C., Blocker, T.D., Pham, L.L., Checotah, S., Norman, A.A., Harader-Pate, B.K., Reidenbaugh, R.T., Nenchev, P., Barthell, J.F., Wells, H., 2009. Different solutions by bees to a foraging problem. Anim. Behav. 77, 1273–1280. https://doi.org/10.1016/j.anbehav.2009.01.032

Camazine, S. 1993. The regulation of pollen foraging by honey bees: How foragers assess the colony's need for pollen. Behav Ecol Sociobiol 32: 265 – 272.

Goering, D. 2016. North Dakota Pollinator Plan. North Dakota Department of Agriculture. Bismarck, North Dakota.

Fenster, C.B., Reynolds, R.J., Williams, C.W., Makowsky, R., Dudash, M.R. 2015. Quantifying hummingbird preference for floral trait combinations: The role of selection on trait interactions in the evolution of pollination syndromes. Evolution 69, 1113–1127. https://doi.org/10.1111/evo.12639

Herbertsson, L., Lindström, S.A.M., Rundlöf, M., Bommarco, R., Smith, H.G. 2016. Competition between managed honeybees and wild bumblebees depends on landscape context. Basic and Applied Ecology. https://doi.org/10.1016/j.baae.2016.05.001

Kearns, C.A., Inouye, D.W., 1993. Techniques for pollination biologists. University Press of Colorado.

Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C., Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. Proceedings of the Royal Society B-Biological Sciences 274, 303–313.

Knauer, A.C., Schiestl, F.P., 2015. Bees use honest floral signals as indicators of reward when visiting flowers. Ecology Letters 18, 135–143. https://doi.org/10.1111/ele.12386

Krauss, J., Steffan-Dewenter, I., Tscharntke, T. 2003. How does landscape context contribute to effects of habitat fragmentation on diversity and population density of butterflies? Journal of Biogeography 30, 889–900. https://doi.org/10.1046/j.1365-2699.2003.00878.x

Kremen, C., M'Gonigle, L.K., 2015. EDITOR'S CHOICE: Small-scale restoration in intensive agricultural landscapes supports more specialized and less mobile pollinator species. J Appl Ecol 52, 602–610. https://doi.org/10.1111/1365-2664.12418

Kudo, G., Ida, T.Y., 2013. Early onset of spring increases the phenological mismatch between plants and pollinators. Ecology 94, 2311–2320. https://doi.org/10.1890/12-2003.1

Locke, C., Meils, E., Murray, M. 2016. The Wisconsin Pollinator Protection Plan. Wisconsin Department of Agriculture, Trade, and Consumer Protection. Madison, WI.

Memmott, J., 1999. The structure of a plant-pollinator food web. Ecology Letters 2, 276–280. https://doi.org/10.1046/j.1461-0248.1999.00087.x

Rader, R., Bartomeus, I., Garibaldi, L.A., Garratt, M.P.D., Howlett, B.G., Winfree, R., Cunningham,

S.A., Mayfield, M.M., Arthur, A.D., Andersson, G.K.S., Bommarco, R., Brittain, C., Carvalheiro, L.G., Chacoff, N.P., Entling, M.H., Foully, B., Freitas, B.M., Gemmill-Herren, B., Ghazoul, J., Griffin, S.R., Gross, C.L., Herbertsson, L., Herzog, F., Hipólito, J., Jaggar, S., Jauker, F., Klein, A.-M., Kleijn, D., Krishnan, S., Lemos, C.Q., Lindström, S.A.M., Mandelik, Y., Monteiro, V.M., Nelson, W., Nilsson, L., Pattemore, D.E., de O. Pereira, N., Pisanty, G., Potts, S.G., Reemer, M., Rundlöf, M., Sheffield, C.S., Scheper, J., Schüepp, C., Smith, H.G., Stanley, D.A., Stout, J.C., Szentgyörgyi, H., Taki, H., Vergara, C.H., Viana, B.F., Woyciechowski, M., 2015. Non-bee insects are important contributors to global crop pollination. Proceedings of the National Academy of Sciences 201517092. https://doi.org/10.1073/pnas.1517092112

Rundlöf, M., Andersson, G.K.S., Bommarco, R., Fries, I., Hederström, V., Herbertsson, L., Jonsson, O., Klatt, B.K., Pedersen, T.R., Yourstone, J., Smith, H.G., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. Nature 521, 77–80. https://doi.org/10.1038/nature14420

Sakata, Y., Nakahama, N. 2018. Flexible pollination system in an unpalatable shrub Daphne miyabeana (Thymelaeaceae). Plant Species Biology https://doi.org/10.1111/1442-1984.12212

Singh, R., Levitt, A.L., Rajotte, E.G., Holmes, E.C., Ostiguy, N., vanEngelsdorp, D., Lipkin, W.I., dePamphilis, C.W., Toth, A.L., Cox-Foster, D.L., 2010. RNA Viruses in Hymenopteran Pollinators: Evidence of Inter-Taxa Virus Transmission via Pollen and Potential Impact on Non-Apis Hymenopteran Species. PLoS ONE 5, e14357. https://doi.org/10.1371/journal.pone.0014357

Steffan-Dewenter, I., Munzenberg, U., Burger, C., Thies, C., Tscharntke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. Ecology 83, 1421–1432.

Wilson, J.S., Carril, O.J.M., 2015. The Bees in Your Backyard: A Guide to North America's Bees. Princeton University Press, Princeton.

Winfree, R., Aguilar, R., Vázquez, D.P., LeBuhn, G., Aizen, M.A., 2009. A meta-analysis of bees' responses to anthropogenic disturbance. Ecology 90, 2068–2076. https://doi.org/10.1890/08-1245.1

Weekly Schedule of Topics Week 1: Plants: plant reproduction
Week 2: Pollinators: Bees, other insects, other animals
Week 3: Pollinator behavior: foraging theory, learning
Week 4: Plant-pollinator interactions: Co-evolution, pollination syndromes, networks
Week 5: Plant-pollinator interactions continued, crop pollination requirements
Week 6: Research methods and midterm
Week 7: Introduction to pollinator declines and conservation, student presentations
Week 8: Student Presentations
Week 9: Spring break
Week 10: Pollinator stressors: land-use change and pesticides
Week 11: Pollinator stressors: diseases **visit sites for research projects
Week 12: Pollinator stressors: climate change, invasive species, managed bees ** data collection and organizing
Week 13: data collection outside in groups
Week 14: Pollinator conservation: conservation plans **analyzing plant-pollinator data: statistics, graphs, and tables
Week 15: Pollinator conservation: habitat restoration, pollinator plantings, integrated crop pollination ** paper peer-review in pairs
Week 16: Papers due, flexible time, reading day
Finals week: Course wrap-up

Links and Policies Attendance and Make-Up Work
Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Online Course Evaluation Process
Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last

two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Academic Honesty
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software Use:
All faculty, staff and students of the university are required and expected to obey the 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.

Services for Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
- Counseling Services
- Groups and Workshops
- Outreach and Consultation
- Self-Help Library
- Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Grading Scheme Participation: 50 pts (9%)
Quizzes (8): 80 pts (14.5%)
Leading discussion: 50 pts (9%)
Research project paper: 120 pts (22%)
Paper peer-review: 25 pts (4.5%)
Presentation on pollinator or plant: 100 pts (18%)

Midterm: 125 pts (23%)

Quizzes: There will be 10 unannounced quizzes throughout the semester that will cover the assigned readings for each day, and will take place at the beginning of class prior to discussion or lecture. Your lowest 2 quizzes for the semester will be dropped, and your grade for this component will be based on the best 8 of 10 quizzes.

Leading discussion: Graduate students will lead discussion on scientific papers assigned throughout the semester. Graduate students will be responsible for selecting a second reading to complement the assigned reading listed in the syllabus. Selected papers must be emailed to me at least 1 week prior to the scheduled discussion for approval and dissemination to the rest of the class. On the day of discussion, graduate students will turn in a list of discussion questions that they have prepared for class.

Presentation: Each student will present on a selected pollinator or plant. Presentations should be approximately 10 minutes long and cover the general biology, ecology, and geography of the pollinator or plant, as well as the conservation status or threats to current populations of the pollinator/plant.

Research project paper: In groups of 4, you will be generating a research question and carrying out a field lab related to some aspect of pollination biology or pollinator ecology. We will learn about research methods and visit sites near Steinmetz Hall for data collection, followed by time in class to work as groups and collect data. Students may have to collect additional data outside of class time. While projects will be conducted in groups of 4, students must write up individual papers in the format of a scientific manuscript including an introduction, methods, results, and discussion. Paper drafts will be peer-reviewed in student pairs 1 week prior to the due date, and your review of a classmate's paper will account for 25 points of your total course grade. Graduate student papers should be 7-8 pages in length, excluding any tables, figures, or references list, with a minimum of 10 scientific references. Additional criteria and writing tips will be distributed in class.

Grade distribution:

A	94.0 - 100
A-	90.0 – 93.99
B+	86.0 – 89.99
B	83.0 – 85.99
B-	80.0 – 82.99
C+	76.0 – 79.99
C	73.0 – 75.99
C-	70.0 – 72.99
D+	66.0 – 69.99
D	63.0 – 65.99
D-	60.0 – 62.99
E	59.99 and below

Instructor(s) Rachel Mallinger

4XXX/6XXX: Ecology and Conservation of Pollinators, 3 credits

Meeting day and time: TBD

Instructor: Dr. Rachel Mallinger

2110 Steinmetz Hall

rachel.mallinger@ufl.edu

352-273-3962

Office Hours: TBD, 2110 Steinmetz Hall

Course Description: This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.

Course Background: Welcome to Ecology and Conservation of Pollinators! Pollinators are keystone species in both natural and agricultural habitats, responsible for the reproduction of an estimated 87.5% of flowering plants including many crops. In recent years, documented declines in some pollinator species have heightened awareness of pollinator conservation. In the first half of this course, we will explore the fascinating world of pollination ecology, including plant-pollinator interactions, co-evolution, and pollinator foraging behaviors In the second half of the class, we will discuss the conservation status of pollinators, including stressors such as climate change, land-use change, pesticides, and pathogens. Students will conduct an inquiry-based field research project on pollinator ecology, and will additionally present to the class on a selected pollinator or plant.

Prerequisites: BSC 2010 and 2010 L, with a grade of C- or higher, or equivalent, and junior or senior standing, or instructor permission.

College-level general biology is required; a course in botany (e.g. BOT 2010C), ecology (e.g. PCB 4043C) or entomology (ENY 3005) is encouraged but not required.

Learning Objectives: By the end of the class, students will be able to:

1. Describe the role of pollinators in both natural and agricultural systems, and the breadth of animal pollinator taxa.
2. Explain basic concepts of pollination ecology and relate these concepts to observable phenomena in nature.
3. Diagnose factors affecting pollinator populations today, and assess the consequences of pollinator declines for biodiversity and global food production.
4. Analyze, interpret and critique scientific literature.
5. Develop and carry out a field-based research project.
6. Communicate research in the form of a scientific paper and oral presentation.

Required materials: No textbook is required for this course. Readings for the course will be provided to students via the course website in Canvas.

Grades and assignments:
This course is a joint undergraduate and graduate level course; both graduate and undergraduate students will attend the same on-campus class periods. Graduate students will be expected to do an additional assignment (lead discussion), a more rigorous assignment (longer and more in-depth research paper), and additional readings (for research paper and discussion) as further outlined below.

	Undergraduate (500 points total)	**Graduate (550 points total)**
participation	50 pts	50 pts
quizzes (8)	80 pts	80 pts
leading discussion	NA	50 pts
research project paper	120 pts	120 pts
paper peer-review	25 pts	25 pts
presentation on pollinator/plant conservation	100 pts	100 pts
midterm exam	125 pts	125 pts

Quizzes: There will be 10 unannounced quizzes throughout the semester that will cover the assigned readings for each day, and will take place at the beginning of class prior to discussion or lecture. Your lowest 2 quizzes for the semester will be dropped, and your grade for this component will be based on the best 8 of 10 quizzes.

***Leading discussion*:** Graduate students will lead discussion on scientific papers assigned throughout the semester. Graduate students will be responsible for **selecting a second reading** to complement the assigned reading listed in the syllabus. Selected papers must be emailed to me at least 1 week prior to the scheduled discussion for approval and dissemination to the rest of the class. On the day of discussion, graduate students leading the discussion will turn in a list of discussion questions that they have prepared for class.

Presentation: Each student will present on a selected pollinator or plant. Presentations should be approximately 10 minutes long and cover the general biology, ecology, and geography of the pollinator or plant, as well as the conservation status or threats to current populations of the pollinator/plant.

Research project paper: In groups of four, you will be generating a research question and carrying out a field lab related to some aspect of pollination biology or pollinator ecology. We will learn about research methods and visit sites near Steinmetz Hall for data collection, followed by time in class to work as groups and collect data. Students may have to collect additional data outside of class time. While projects will be conducted in groups of four, students must write up **individual papers** in the format of a scientific manuscript including an introduction, methods, results, and discussion. Paper drafts will be peer-reviewed in student pairs prior to the due date, and your review of a classmate's paper will account for 25 points of your total course grade. Undergraduate student papers should be 4-5 pages in length, excluding any tables, figures, or references list, with a minimum of 3 scientific references, while graduate student papers should

be 7-8 pages in length, excluding any tables, figures, or references list, with a minimum of 10 scientific references. Additional criteria and writing tips will be distributed in class.

Grade distribution:

A	94.0 - 100
A-	90.0 – 93.99
B+	86.0 – 89.99
B	83.0 – 85.99
B-	80.0 – 82.99
C+	76.0 – 79.99
C	73.0 – 75.99
C-	70.0 – 72.99
D+	66.0 – 69.99
D	63.0 – 65.99
D-	60.0 – 62.99
E	59.99 and below

Grades and Grade Points

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Course schedule and due dates:

Week	Date	Topic	Reading	Assignments due and important notes
1	Jan 8 - T	Course introduction		
1	Jan 10 - Th	Plants: reproduction and pollination	Sakata and Nakahama 2018	discussion (instructor-led)
2	Jan 15 - T	Pollinators: Bees	Sections from Wilson and Carril 2015	
2	Jan 17 - Th	Pollinators: Other insects and non-insect animals	Rader et al. 2015; Aguilar-Rodriguez et al. 2015	discussion
3	Jan 22 - T	Pollinator behavior: foraging theory	Cakmak et al. 2009	
3	Jan 24 - Th	Pollinator behavior: floral cues and learning	Knauer and Schiestl 2015	discussion
4	Jan 29 – T	Pollinator behavior: social insects and behavior at colony level	Camazine 1993	
4	Jan 31 – Th	Plant-pollinator interactions: Coevolution and pollination syndromes	Fenster et al. 2015	discussion
5	Feb 5 – T	Plant-pollinator interactions: networks, specialization, flexible foraging	Memmott 1999	
5	Feb 7 – Th	Crop pollination: pollinator-dependent crops and managed pollinators	Klein et al. 2007	discussion

6	Feb 12 – T	Research methods: plants and pollinators.	selected sections from Kearns and Inouye 1993	
6	Feb 14 – Th	Midterm		**Midterm**
7	Feb 19 – T	Introduction to pollinator declines and conservation	Winfree et al. 2009	discussion
7	Feb 21 – Th	Presentations		
8	Feb 26 – T	Presentations		
8	Feb 28 – Th	Presentations		
9	Spring break			
10	March 12 – T	Pollinator stressors: land-use change	Steffan-Dewenter et al. 2002; Krauss et al. 2003	discussion
10	March 14 – Th	Pollinator stressors: pesticides **Research group formation	Rundlof et al. 2015	discussion, time in groups for research planning
11	March 19 – T	Pollinator stressors: pathogens	Singh et al. 2010	discussion
11	March 21 – Th	visit sites around campus for research project		outside
12	March 26 – T	lecture on data collection and organization **time for project planning in groups		**Research project outline due at end of class**
12	March 28 – Th	Pollinator stressors: climate change, invasive species, managed bees	Kudo and Ida 2013, Herbertsson et al. 2016	discussion
13	April 2 – T	data collection in groups		outside
13	April 4 – Th	data collection in groups		outside
14	April 9 – T	Pollinator conservation: conservation plans (back-up data collection day)	excerpts from Wisconsin and North Dakota Pollinator Protection Plans	
14	April 11 – Th	Analyzing plant-pollinator data: statistics, tables, and graphs ** time for working in groups on analyzing data		
15	April 16 – T	Pollinator conservation: habitat restoration, pollinator plantings	Kremen and M'Gonigle 2015	discussion **paper rough drafts due for peer-review**
15	April 18 – Th	Pollinator conservation: integrated crop pollination ** paper peer-review in student pairs		**peer review forms due at end of class**
16	April 23 - T	Flex day		**Research papers due**
16	April 25 - Th	Reading day		
finals week		Course wrap-up		

Full reading list

Aguilar-Rodríguez, P.A., G, M., Cristina, M., Krömer, T., García-Franco, J.G., Knauer, A., Kessler, M., 2014. First record of bat-pollination in the species-rich genus Tillandsia (Bromeliaceae). Ann Bot 113, 1047–1055. https://doi.org/10.1093/aob/mcu031

Cakmak, I., Sanderson, C., Blocker, T.D., Pham, L.L., Checotah, S., Norman, A.A., Harader-Pate, B.K., Reidenbaugh, R.T., Nenchev, P., Barthell, J.F., Wells, H., 2009. Different solutions by bees to a foraging problem. Anim. Behav. 77, 1273–1280. https://doi.org/10.1016/j.anbehav.2009.01.032

Camazine, S. 1993. The regulation of pollen foraging by honey bees: How foragers assess the colony's need for pollen. Behav Ecol Sociobiol 32: 265 – 272.

Goering, D. 2016. North Dakota Pollinator Plan. North Dakota Department of Agriculture. Bismarck, North Dakota.

Fenster, C.B., Reynolds, R.J., Williams, C.W., Makowsky, R., Dudash, M.R. 2015. Quantifying hummingbird preference for floral trait combinations: The role of selection on trait interactions in the evolution of pollination syndromes. Evolution 69, 1113–1127. https://doi.org/10.1111/evo.12639

Herbertsson, L., Lindström, S.A.M., Rundlöf, M., Bommarco, R., Smith, H.G. 2016. Competition between managed honeybees and wild bumblebees depends on landscape context. Basic and Applied Ecology. https://doi.org/10.1016/j.baae.2016.05.001

Kearns, C.A., Inouye, D.W., 1993. Techniques for pollination biologists. University Press of Colorado.

Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C., Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. Proceedings of the Royal Society B-Biological Sciences 274, 303–313.

Knauer, A.C., Schiestl, F.P., 2015. Bees use honest floral signals as indicators of reward when visiting flowers. Ecology Letters 18, 135–143. https://doi.org/10.1111/ele.12386

Krauss, J., Steffan-Dewenter, I., Tscharntke, T. 2003. How does landscape context contribute to effects of habitat fragmentation on diversity and population density of butterflies? Journal of Biogeography 30, 889–900. https://doi.org/10.1046/j.1365-2699.2003.00878.x

Kremen, C., M'Gonigle, L.K., 2015. EDITOR'S CHOICE: Small-scale restoration in intensive agricultural landscapes supports more specialized and less mobile pollinator species. J Appl Ecol 52, 602–610. https://doi.org/10.1111/1365-2664.12418

Kudo, G., Ida, T.Y., 2013. Early onset of spring increases the phenological mismatch between plants and pollinators. Ecology 94, 2311–2320. https://doi.org/10.1890/12-2003.1

Locke, C., Meils, E., Murray, M. 2016. The Wisconsin Pollinator Protection Plan. Wisconsin Department of Agriculture, Trade, and Consumer Protection. Madison, WI.

Memmott, J., 1999. The structure of a plant-pollinator food web. Ecology Letters 2, 276–280. https://doi.org/10.1046/j.1461-0248.1999.00087.x

Rader, R., Bartomeus, I., Garibaldi, L.A., Garratt, M.P.D., Howlett, B.G., Winfree, R., Cunningham, S.A., Mayfield, M.M., Arthur, A.D., Andersson, G.K.S., Bommarco, R., Brittain, C., Carvalheiro, L.G., Chacoff, N.P., Entling, M.H., Foully, B., Freitas, B.M., Gemmill-Herren, B., Ghazoul, J., Griffin, S.R., Gross, C.L., Herbertsson, L., Herzog, F., Hipólito, J., Jaggar, S., Jauker, F., Klein, A.-M., Kleijn, D., Krishnan, S., Lemos, C.Q., Lindström, S.A.M., Mandelik, Y., Monteiro, V.M., Nelson, W., Nilsson, L., Pattemore, D.E., de O. Pereira, N., Pisanty, G., Potts, S.G., Reemer, M., Rundlöf, M., Sheffield, C.S., Scheper, J., Schüepp, C., Smith, H.G., Stanley, D.A., Stout, J.C.,

Szentgyörgyi, H., Taki, H., Vergara, C.H., Viana, B.F., Woyciechowski, M., 2015. Non-bee insects are important contributors to global crop pollination. Proceedings of the National Academy of Sciences 201517092. https://doi.org/10.1073/pnas.1517092112

Rundlöf, M., Andersson, G.K.S., Bommarco, R., Fries, I., Hederström, V., Herbertsson, L., Jonsson, O., Klatt, B.K., Pedersen, T.R., Yourstone, J., Smith, H.G., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. Nature 521, 77–80. https://doi.org/10.1038/nature14420

Sakata, Y., Nakahama, N. 2018. Flexible pollination system in an unpalatable shrub Daphne miyabeana (Thymelaeaceae). Plant Species Biology https://doi.org/10.1111/1442-1984.12212

Singh, R., Levitt, A.L., Rajotte, E.G., Holmes, E.C., Ostiguy, N., vanEngelsdorp, D., Lipkin, W.I., dePamphilis, C.W., Toth, A.L., Cox-Foster, D.L., 2010. RNA Viruses in Hymenopteran Pollinators: Evidence of Inter-Taxa Virus Transmission via Pollen and Potential Impact on Non-Apis Hymenopteran Species. PLoS ONE 5, e14357. https://doi.org/10.1371/journal.pone.0014357

Steffan-Dewenter, I., Munzenberg, U., Burger, C., Thies, C., Tscharntke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. Ecology 83, 1421–1432.

Wilson, J.S., Carril, O.J.M., 2015. The Bees in Your Backyard: A Guide to North America's Bees. Princeton University Press, Princeton.

Winfree, R., Aguilar, R., Vázquez, D.P., LeBuhn, G., Aizen, M.A., 2009. A meta-analysis of bees' responses to anthropogenic disturbance. Ecology 90, 2068–2076. https://doi.org/10.1890/08-1245.1

Attendance and Make-Up Work

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

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*" You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers,

quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, **www.dso.ufl.edu/drc/**

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* **www.counseling.ufl.edu/cwc/**

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Wellness Coaching

- U Matter We Care, **www.umatter.ufl.edu/**
- *Career Resource Center,* First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

Student Complaints

Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
Online Course: http://www.distance.ufl.edu/student-complaint-process

Cover Sheet: Request 12896

FAS5xxx Invasion Ecology of Aquatic Animals

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rhiannon Pollard rhiannon-pollard@ufl.edu
Created	8/2/2018 11:16:49 AM
Updated	8/6/2018 2:31:29 PM
Description of request	Create new course in Fisheries and Aquatic Sciences

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Forest Resources and Conservation 514946000	William Lindberg		8/6/2018
FAS5xxx_invasionecology.docx					8/2/2018
College	Pending	CALS - College of Agricultural and Life Sciences			8/6/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12896

Info

Request: FAS5xxx Invasion Ecology of Aquatic Animals
Description of request: Create new course in Fisheries and Aquatic Sciences
Submitter: Rhiannon Pollard rhiannon-pollard@ufl.edu
Created: 8/2/2018 11:05:43 AM
Form version: 1

Responses

Recommended Prefix FAS
Course Level 5
Number xxx
Category of Instruction Introductory
Lab Code None
Course Title Invasion Ecology of Aquatic Animals
Transcript Title Invasion Ecol Aquatic
Degree Type Graduate

Delivery Method(s) Online
Co-Listing No
Co-Listing Explanation n/a
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description A comprehensive overview of invasion ecology, highlighting aspects related to aquatic animals, including ecological concepts and debates underlying this developing field; biology and life history of nonnative aquatic animals, including characteristics of successful invaders; risk analysis methodology; and the conservation and regulatory implications of nonnative aquatic species.
Prerequisites n/a
Co-requisites n/a
Rationale and Placement in Curriculum Students intending to successfully obtain careers in fisheries and aquatic ecology sciences must be equipped with an understanding of real-world issues with invasive species and how to assess, manage, conserve aquatic ecosystems with potential or actual invasives. This course provides experience with these critical topics.
Course Objectives At the end of this course, each student will be able to:

- Describe concepts associated with species invasions.
- Utilize basic risk assessment methodology
- Critically evaluate literature and arguments, especially when faces with uncertainty and scientific disagreement.
- Communicate effectively about invasion ecology.
- Describe the complex relationship between science, management, and regulation.

Course Textbook(s) and/or Other Assigned Reading There is no required textbook for the course.

Required readings will be provided in Canvas and will include papers listed under "Readings" below which must be read by about the date specified below as they will be discussed in class and participation is expected.
Additional References

- Davis, M.A. 2009. Invasion Biology. Oxford University Press.
- Elton, C.E. 1958. The Ecology of Invasions by Animals and Plants. Revised edition (2000).

The University of Chicago Press.

- Lockwood, J.L., M.F. Hoopes, and M.P. Marchetti. 2007. Invasion Ecology. Blackwell Publishing.
- Williamson, M. 1996. Biological Invasions. Chapman & Hall.

Readings

Colautti, R.I., and H.J. MacIsaac. 2004. A neutral terminology to define 'invasive' species. Diversity and Distributions 10: 135-141.

Hill, J.E. 2008. Non-native species in aquaculture: terminology, potential impacts, and the invasion process. USDA-Southern Regional Aquaculture Center Publication No. 4303.

Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52: 273-288.

Gozlan, R.E. 2008. Introduction of non-native freshwater fish: is it all bad? Fish and Fisheries 9: 106-115.

Vitule, J.R., C.A. Freire, and D. Simberloff. 2009. Introduction of non-native freshwater fish can certainly be bad. Fish and Fisheries 10: 98-108.

Courtenay, Jr., W.R. 1997. Nonindigenous fishes. Pages 109-122 in D.S. Simberloff, D.C. Schmitz, and T.C. Brown, editors. Strangers in Paradise, Island Press.

Shafland, P.L. 1996. Exotic fish assessments: an alternative view. Reviews in Fisheries Science 4:123-132.

Hill, J.E. 2002. Exotic fishes in Florida. LakeLines, North American Lake Management Society 22(1):39-43.

Trexler, J.C., W.F. Loftus, F. Jordan, J.J. Lorenz, J.H.
Chick, and R.M. Kobza. 2000. Empirical assessment of fish introductions in a subtropical wetland: an evaluation of contrasting views. Biological Invasions 2:265-277.

Hill, J.E. 2009. Risk analysis for non-native species in aquaculture. USDA-Southern Regional Aquaculture Center Publication No. 4304.

RAM Committee (Risk Assessment and Management Committee). 1996. Generic nonindigenous aquatic organisms risk analysis review process. Aquatic Nuisance Species Task Force.

Verbrugge, L.N., G. van der Velde, A.J. Hendriks, H. Verreycken, and R.S. Leuven. 2012. Risk classification of aquatic non-native species: Application of contemporary European assessment protocols in different biogeographical settings. Aquatic Invasions 7: 49-58.

Vander Zanden, M.J., and J.D. Olden. 2008. A management framework for preventing the secondary spread of aquatic invasive species. Canadian Journal of Fisheries and Aquatic Sciences 65: 1512-1522.

Jeschke, J. 2014. General Hypotheses in Invasion Ecology. Diversity and Distributions 20:1229-1234.

DeRivera, C. E., G.M. Ruiz, A.H. Hines, and P. Jivoff. 2005. Biotic Resistance to Invasion: Native predator limits abundance and distribution of an introduced crab. Ecology 86 (12): 3364-3376.

Shea, K. and P. Chesson. 2002. Community ecology theory as a framework for biological invasions. Trends in Ecology and Evolution 17: 170-176.

Weekly Schedule of Topics 1 Introduction/Pathways of Introduction
2 Biogeography/Invasion Process
3 Stages of Invasion Process
4 Invasion Process Theory. Species Choice Due
5 Impacts
6 Impacts
7 Classic Case Studies. Species Profiles Due; Review/Data Set Topic Due.

8 Florida Case Studies/Review
9 Spring Break—No Class
10 Risk Analysis/Risk Assessment. Mid-Term Exam
11 Risk Assessment
12 Risk Assessment Case Studies
13 International, Federal, and State Management and Policy. Risk Assessment Presentation
14 Management Techniques/Case Studies
15 Ecological Theory
16 Ecological Theory/Review. Topic Reviews or Data Papers Due
Final Exam (Thursday 3-5 pm)

Links and Policies All required UF and CALS policies are included in the syllabus.
Grading Scheme 15% Species Synopsis
20% Mid-Term exam
15% Risk assessment
20% Topic review/Data Paper
20% Final exam
10% Discussion participation

Grading Scale (%)
A 94-100%;
A- 90-93;
B+ 86-89;
B 83-85;
B- 80-82;
C+ 76-79;
C 73-75;
C- 70-72;
D+ 66-69;
D 63-65;
D- 60-62;
E <60%

Instructor(s) Dr. Jeff Hill

Invasion Ecology of Aquatic Animals - FAS 5xxx

1 Overview

A comprehensive overview of invasion ecology, highlighting aspects related to aquatic animals, including ecological concepts and debates underlying this developing field; biology and life history of nonnative aquatic animals, including characteristics of successful invaders; risk analysis methodology; and the conservation and regulatory implications of nonnative aquatic species.

- 3 Credits
- Spring semester
- Online
- http://elearning.ufl.edu/

Course Prerequisites: None. Students should have prior coursework in biology and have an understanding of basic ecological concepts.

Instructor: Dr. Jeff Hill, PhD. jeffhill@ufl.edu. 1408 24th Street SE, Ruskin, FL 33570. 813-671-5230 x118

- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email or phone; office visits available by appointment.

Textbook(s) and/or readings: There is no required textbook for the course. Required readings will be provided in Canvas and will include papers listed under "Readings" below which must be read by about the date specified below as they will be discussed in class and participation is expected.

Additional References

- Davis, M.A. 2009. Invasion Biology. Oxford University Press.
- Elton, C.E. 1958. The Ecology of Invasions by Animals and Plants. Revised edition (2000). The University of Chicago Press.
- Lockwood, J.L., M.F. Hoopes, and M.P. Marchetti. 2007. Invasion Ecology. Blackwell Publishing.
- Williamson, M. 1996. Biological Invasions. Chapman & Hall.

2 Learning Outcomes

At the end of this course, each student will be able to:

- Describe concepts associated with species invasions.
- Utilize basic risk assessment methodology
- Critically evaluate literature and arguments, especially when faces with uncertainty and scientific disagreement.
- Communicate effectively about invasion ecology.
- Describe the complex relationship between science, management, and regulation.

3 Course Logistics

This course is entirely web-based and students may access lectures, readings, and supporting materials as they become available each week. Synchronous participation will be available through Canvas using Zoom.

Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A headset and/or microphone and speakers; a web cam is suggested.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. What browser am I using?
- Zoom (video conference) instructions will be provided within Canvas.

3.1 Assignments & Deliverables

Online Discussions

This course includes class discussions of the assigned readings. This forms the basis for the participation grade. For the online version of this course, face-to-face discussions will be replaced with text-based discussion threads in Canvas. The instructor or teaching assistant will create, start, and moderate each discussion.

- Discussions will be announced once they are created so check Canvas frequently.
- Each student is required to post a minimum of three comments and/or replies per discussion. Discussions will remain open for one week.
- Two discussion grades will be dropped.

Species Synopsis

Students will choose a non-native aquatic species of relevance to Florida and write a brief species synopsis. The species may be freshwater, estuarine, or marine and must be a non-plant taxon. Species will be chosen in consultation with the course instructor to prevent student overlap. A detailed outline of the project requirements will be provided during class. In brief, students will conduct literature and internet searches to obtain information on the occurrence, life history, ecology, effects, and regulatory status of the species and write a fact sheet summarizing this information and pointing out gaps in knowledge.

Risk Assessment

Students will participate in teams to conduct a risk assessment using the Federal Aquatic Nuisance Species Task Force RAM Committee Generic Analysis method or a risk screen using the Fish Invasiveness Screening Kit (FISK or related FISK-like variant) on a select group from the class species synopses. Teams will present their work and lead a discussion of their risk assessment during class. More detailed instructions will be provided during class.

Topic Review/Data Paper

Graduate students have two options for this assignment—(1) a topic review or (2) a paper based on the analysis of a data set. Topics or data sets must be approved by the instructor. (Option 1) The student will choose an ecological topic pertinent to invasion ecology (e.g., relation of community diversity and

invasibility) and write a detailed literature review of the subject. (Option 2) The student will provide a data set pertinent to invasion ecology, analyze the data, and write a short, data-based paper. This project will provide experience in finding and obtaining literature, assimilating and synthesizing technical information, and producing a detailed, written product. More detailed instructions will be provided during class.

Exams

There will be two exams (a midterm and final). These will cover all information in lectures, readings, and from invited speakers. Species profiles and risk assessments (except what is covered in lecture), and topic reviews will not be covered on exams.

3.2 Grades & Grading Scale

15% Species Synopsis

20% Mid-Term exam

15% Risk assessment

20% Topic review/Data Paper

20% Final exam

10% Discussion participation

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Grading Scale (%)
A 94-100%;
A- 90-93;
B+ 86-89;
B 83-85;
B- 80-82;
C+ 76-79;
C 73-75;
C- 70-72;
D+ 66-69;
D 63-65;
D- 60-62;
E <60%

4 Course Content

Learning Modules

1 Introduction/Pathways of Introduction

2 Biogeography/Invasion Process

3 Stages of Invasion Process

4 Invasion Process Theory. *Species Choice Due*

5 Impacts

6 Impacts

7 Classic Case Studies. *Species Profiles Due; Review/Data Set Topic Due.*

8 Florida Case Studies/Review

9 Spring Break—No Class

10 Risk Analysis/Risk Assessment. *Mid-Term Exam*

11 Risk Assessment

12 Risk Assessment Case Studies

13 International, Federal, and State Management and Policy. *Risk Assessment Presentation*

14 Management Techniques/Case Studies

15 Ecological Theory

16 Ecological Theory/Review. *Topic Reviews or Data Papers Due*

Final Exam (Thursday 3-5 pm)

5 Readings

Papers	Read by:
Colautti, R.I., and H.J. MacIsaac. 2004. A neutral terminology to define 'invasive' species. Diversity and Distributions 10: 135-141.	Jan 12
Hill, J.E. 2008. Non-native species in aquaculture: terminology, potential impacts, and the invasion process. USDA-Southern Regional Aquaculture Center Publication No. 4303.	Jan 19
Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52: 273-288.	Feb 9
Gozlan, R.E. 2008. Introduction of non-native freshwater fish: is it all bad? Fish and Fisheries 9: 106-115. Vitule, J.R., C.A. Freire, and D. Simberloff. 2009. Introduction of non-native freshwater fish can certainly be bad. Fish and Fisheries 10: 98-108.	Feb 16
Courtenay, Jr., W.R. 1997. Nonindigenous fishes. Pages 109-122 *in* D.S. Simberloff, D.C. Schmitz, and T.C. Brown, editors. Strangers in Paradise, Island Press. Shafland, P.L. 1996. Exotic fish assessments: an alternative view. Reviews in Fisheries Science 4:123-132.	Feb 23
Hill, J.E. 2002. Exotic fishes in Florida. LakeLines, North American Lake Management Society 22(1):39-43. Trexler, J.C., W.F. Loftus, F. Jordan, J.J. Lorenz, J.H. Chick, and R.M. Kobza. 2000. Empirical assessment of fish introductions in a subtropical wetland: an evaluation of contrasting views. Biological Invasions 2:265-277.	March 8
Hill, J.E. 2009. Risk analysis for non-native species in aquaculture. USDA-Southern Regional Aquaculture Center Publication No. 4304.	March 15
RAM Committee (Risk Assessment and Management Committee). 1996. Generic nonindigenous aquatic organisms risk analysis review process. Aquatic Nuisance Species Task Force. Verbrugge, L.N., G. van der Velde, A.J. Hendriks, H. Verreycken, and R.S. Leuven. 2012. Risk classification of aquatic non-native species: Application of contemporary European assessment protocols in different biogeographical settings. Aquatic Invasions 7: 49-58.	March 22

Vander Zanden, M.J., and J.D. Olden. 2008. A management framework for preventing the secondary spread of aquatic invasive species. Canadian Journal of Fisheries and Aquatic Sciences 65: 1512-1522.	April 5
Jeschke, J. 2014. General Hypotheses in Invasion Ecology. Diversity and Distributions 20:1229-1234. DeRivera, C. E., G.M. Ruiz, A.H. Hines, and P. Jivoff. 2005. Biotic Resistance to Invasion: Native predator limits abundance and distribution of an introduced crab. Ecology 86 (12): 3364-3376.	April 12
Shea, K. and P. Chesson. 2002. Community ecology theory as a framework for biological invasions. Trends in Ecology and Evolution 17: 170-176.	April 19

6 Policies and Requirements

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

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6.6 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: http://multicultural.ufl.edu.

6.7 Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

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- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | http://elearning.ufl.edu
- Library Help Desk support http://cms.uflib.ufl.edu/ask
- SFRC Academic Hub https://ufl.instructure.com/courses/303721

7.1 Student Life, Wellness, and Counseling Help

- Counseling and Wellness resources http://www.counseling.ufl.edu/cwc/
- U Matter, We Care serves as UF's umbrella program for UF's caring culture and provides students in distress with support and coordination of the wide variety of appropriate resources. Visit http://www.umatter.ufl.edu/ or contact umatter@ufl.edu seven days a week for assistance for students in distress.
- Career Resource Center http://www.crc.ufl.edu/
- Other resources are available at http://www.distance.ufl.edu/getting-help for online students.

7.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

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Cover Sheet: Request 12895

FAS6xxx Environmental Physiology of Fishes

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rhiannon Pollard rhiannon-pollard@ufl.edu
Created	8/2/2018 11:04:36 AM
Updated	8/6/2018 2:33:33 PM
Description of request	Create new course at the graduate level in Fisheries and Aquatic Sciences.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Forest Resources and Conservation 514946000	William Lindberg		8/6/2018
FAS6932_EnvFishPhysio.docx					8/2/2018
College	Pending	CALS - College of Agricultural and Life Sciences			8/6/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12895

Info

Request: FAS6xxx Environmental Physiology of Fishes
Description of request: Create new course at the graduate level in Fisheries and Aquatic Sciences.
Submitter: Rhiannon Pollard rhiannon-pollard@ufl.edu
Created: 5/25/2018 8:22:30 AM
Form version: 1

Responses

Recommended Prefix FAS
Course Level 6
Number xxx
Category of Instruction Intermediate
Lab Code None
Course Title Environmental Physiology of Fishes
Transcript Title Envir Physiol Fishes
Degree Type Graduate

Delivery Method(s) Online
Co-Listing No
Co-Listing Explanation n/a
Effective Term Spring
Effective Year 2019
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description Advanced topics on physiology of fishes, such as features and adaptations at different levels of biological organization, their implications, and applications. Students will gain an appreciation for, understanding of, and ability to formulate controlled scientific experiments to generate new knowledge about how fishes function.
Prerequisites none
Co-requisites none
Rationale and Placement in Curriculum Biological processes define the function of organisms and their environmental interactions. An understanding of basic physiology is important to many disciplines. My Environmental Physiology of Fishes course provides a solid knowledge base for students of aquatic sciences. In the field of aquaculture, understanding the physiology dictating the animals' biological needs is critical for success in production or research.
Course Objectives At the end of this course, each student will be able to:

- Compare and contrast physiological processes of fish and other animals.
- Critique biological information and ideas in writing.
- Formulate fish physiology research questions and design experiments to answer them.

Course Textbook(s) and/or Other Assigned Reading Required:
Gas exchange/air breathing
Sections I-IV of Evans et al. The multifunctional fish gill. Physiol Rev 85 (2005): 97-117
Nelson.
Breaking wind to survive: fishes that breathe air with their gut. J Fish Biol 84.3 (2014):554-576

Osmoregulation
Req: Section V of Evans et al. The multifunctional fish gill. Physiol Rev 85 (2005): 120-130.

Wilson et al. Intestinal bicarbonate secretion by marine teleost fish – why and how? Biochim Biophys Act 1566 (2002): 182-193

Wilson et al. Contribution of fish to the marine inorganic carbon cycle. Science 323 (2009): 359-362

Thermoregulation
Req: Wegner et al. Whole-body endothermy in a mesopelagic fish, the opah, Lampris guttatus. Science 348 (2015): 786-789

Reproduction
Req: Pages 9-22 of Miller and Kendall. Chapter 1: Fish Reproduction in Early Life History of Marine Fishes (2009) Miller and Nummela eds

Req: McBride et al. Energy acquisition and allocation to egg production in relation to fish reproductive strategies. Fish Fish 16 (2013): 23-57

Req: Brooks et al. Egg quality in fish: what makes a good egg? Rev Fish Biol Fish 7 (1997): 387-416.

Cardiovascular system
Req: Jensen et al. Evolution of the sinus venosus from fish to human. J Cardiovasc Dev Dis 1 (2014): 14-28

Zaccone et al. Morphology, innervation and its phylogenetic step in the heart of the longnose gar. Act Zool 93 (2012): 381-389

Muscles
Req: Coughlin. Aerobic muscle function during steady swimming in fish. Fish Fish 3 (2002): 63-78

Coughlin and Akhtar. Contractile properties of the myotomal muscle of sheepshead. J Exp Zool 323 (2015): 169-178

Thys et al. Longitudinal variation in muscle protein expression and contraction kinetics of largemouth bass axial muscle. J Exp Biol 204 (2001): 4249-4257

Digestion and assimilation
Req: Austreng. Digestibility determination in fish using chromic oxide marking. Aquaculture 13 (1978): 265-272

Sheridan. Lipid dynamics in fish. Comp Biochem Physiol B 90 (1988): 679-690

Infante and Cahu. Ontogeny of the gastrointestinal tract of marine fish larvae. Comp Biochem Physiol C 130 (2001): 477-487

Growth
Req: Mommsen. Paradigms of growth in fish. Comp Biochem Physiol B 129 (2001): 207-219

Johnston et al. Growth and the regulation of myotomal muscle mass in teleost fish. J Exp Biol 214 (2011): 1617-1628

Bhatta et al. Gonads directly regulate growth in teleosts. PNAS 109 (2012): 11408-11412

Neuron function and sensory biology
Req: Eaton et al. The Mauthner cell and other identified neurons of the brainstem escape network of fish. Prog Neurobio 63 (2001): 467-485

Hunt et al. Spectal tuning and molecular evolution of rod visual pigments in the species flock of Cottoid fish in Lake Baikal. Vision Res 36 (1996): 1217-1224

Immune function
Req: Tort et al. Fish immune system: a crossroads between innate and adaptive responses. Immunologia 22 (2003): 277-286

Zapata et al. Ontogeny of the immune system of fish. Fish Shellfish Immun 20 (2006): 126-136

Lipids and homeoviscous
Req: Hazel. Thermal adaptation in biological membranes: is adaptation homeoviscous adaptation the explanation? Annu Rev Physiol 57 (1995): 19-42

Nitrogenous waste
Req: Bucking et al. Immunohistochemical localization of urea and ammonia transporters in two confamilial fish species, the ureotelic gulf toadfish and the ammoniotelic plainfin midshipman. Cell Tissue Res 325 (2013): 623-637

Discussion Papers

Disc: Foran et al. Biogenic fish-gut calcium carbonate is a stable amorphous phase in the gilt-head seabream, Sparus aurata. Sci Reports 3,1700 (2013): 1-5

Thermoregulation
Disc: Armstrong et al. Diel horizontal migration in streams: juvenile fish exploit spatial heterogeneity in thermal and trophic resources. Ecology 94 (2013):2066-2075

Newton et al. Digestive enzyme activities are higher in the shortfin make shark, Isurus oxyrinchus, than in ectothermic sharks as a result of visceral endothermy. Fish Physiol Biochem (2015): 1-12
Reproduction

Disc: Forrester et al. Experimental evidence for density-dependent reproductive output in a coral reef fish. Popul Ecol 53 (2011): 155-163

Donelson et al. Parental condition affects early life-history of a coral reef fish. J Exp Mar Biol Ecol 360 (2008): 109-116

Reproduction
Disc: Tiersch and Yang. Environmental salinity-induced shifts in sperm motility activation in Fundulus grandis. Aquaculture 324-325 (2012): 145-150

Yanagimachi et al. Sperm attractant in the micropyle

region of fish and insect eggs. Biol Reprod 88 (2013): 1-11

Cardiovascular system
Disc: Hicken et al. Sublethal exposure to crude oil during embryonic development alters cardiac morphology and reduces aerobic capacity in adult fish. PNAS 108 (2011): 7086-7090

Digestion and assimilation
Disc: Berens and Murie. Differential digestion and evacuation rates of prey in a warm-temperate grouper. J Fish Biol 72 (2008): 1406-1426

McDonald et al. Phylogenetic analysis of microbial communities in different regions of the gastrointestinal tract in Panaque nigrolineatus, a wood-eating fish. PLoS One 7 (2012): 1-9

Growth
Disc: Jusup et al. A full lifecycle bioenergetic model for bluefin tuna. PLoS One 6 (2011): 1-17

Suda et al. Identification and gene expression analyses of ghrelin in the stomach of Pacific bluefin tuna. Gen Comp Endo 178 (2012): 89-97

Neuron function and sensory biology
Disc: Kittelberger and Bass. Vocal-motor and auditory connectivity of the midbrain periaqueductal gray in a teleost fish. J Comp Neuro 521 (2013): 791-812

Lecchini et al. Variation in brain organization of coral reef fish larvae according to life history traits. Brain Behav Evo (2014): 1-14

Immune function
Disc: Parham. How the codfish changed its immune system. Nature Genetics 48 (2016): 1103-1104.

Nitrogenous waste
Disc: Barimo and Walsh. Use of urea as a chemosensory cloaking molecule by a bony fish. J Exp Biol 209 (2006): 4254-4261.

Weekly Schedule of Topics 1 Introduction and overview
2 Gas exchange and air breathing
3 Osmoregulation
4 Thermoregulation
5 Reproduction I
6 Reproduction II
7 Reproduction III
8 Cardiovascular system
9 Muscles
10 Digestion and assimilation
11 Growth
12 Neuron function and sensory biology
13 Immune function
14 Lipids and homeoviscous adaptation
15 Nitrogenous waste

Links and Policies All required policies by UF and CALS are included in the syllabus.

Grading Scheme 15% or 15 points Discussion (1.5 points each)
20% or 20 points Quizzes (2 points each)
20% or 20 points Mid-Term exam (Learning modules 1-8)

25% or 25 points Final exam (Cumulative, weighted toward learning modules 9-15)
20% or 20 points Experimental design project
For information on current UF policies for assigning grade points, see
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Grading Scale (%)
A 90-100
B+ 85-89.99
B 80-84.99
C+ 75-79.99
C 70-74.99
D+ 65-69.99
D 60-64.99
E < 60

Instructor(s) Dr. Josh Patterson

Environmental Physiology of Fishes - FAS

1 Overview

Advanced topics on physiology of fishes, such as features and adaptations at different levels of biological organization, their implications, and applications. Students will gain an appreciation for, understanding of, and ability to formulate controlled scientific experiments to generate new knowledge about how fishes function.

- 3 Credits
- Spring Semester Odd Numbered Years
- 100% online – asynchronous
- http://elearning.ufl.edu/

Course Prerequisites: (unofficial) Biology of Fishes, or similar course from another institution

Instructor: Dr. Joshua Patterson, **e-mail:** joshpatterson@ufl.edu, **telephone:** 813.419.4917 **office**: Dr. Patterson is located at the Florida Aquarium (FLAQ) Center for Conservation 529 Elsberry Rd. Apollo Beach, FL 33572.

- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email or phone; office visits available by appointment.

Textbook(s) and/or readings: Required readings are listed in Appendices.

2 Learning Outcomes

At the end of this course, each student will be able to:

- Compare and contrast physiological processes of fish and other animals.
- Critique biological information and ideas in writing.
- Formulate fish physiology research questions and design experiments to answer them.

3 Course Logistics

This course is entirely web-based and students may access lectures, readings, and supporting materials as they become available each week.

Learning modules consisting of a lecture, readings, supporting material, class discussion, and a quiz are provided online for each topic. Learning modules should be completed in the order presented because all students in the course are required to participate in each weekly discussion topic.

Each learning module has required readings beyond the lecture. This information will be covered on quizzes and exams. These files will all be made available for you to view on your computer, save, or

print. There may be references to additional (optional) readings and resources if you desire further investigation of a topic.

Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A headset and/or microphone and speakers; a web cam is suggested.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. What browser am I using?

3.1 Assignments & Deliverables

Participation

There are 10 weekly student-led discussions in message board format. The instructor participates in all discussions. Each week, discussion leaders select a scientific paper from the fish physiology literature for the class to read and discuss (see Appendix A). For full credit, students must participate in the discussion by providing thoughtful input on multiple days during the week. This portion of the course is worth 15% of the final grade.

Quizzes & Exams

There are 10 weekly quizzes covering material from lecture modules and assigned readings (see Appendix B). Assigned readings that serve as quiz and exam material are generally review papers or seminal papers on a particular topic in fish physiology. The Mid-Term covers all modules completed at the point. The final is cumulative but weighted towards material covered after the Mid-Term. The instructor hosts a live exam review with students prior to both the Mid-Term and Final. This review is recorded and made available to student that are unable to attend.

- Midterm Week 9 – 20% of the final grade
- Finals Week – 25% of the final grade

Project/Writing Assignment

Completed in groups of 3-4 students. The written assignment has two phases (idea/abstract and final project). Students are asked to design an experiment to answer an important question in environmental physiology of fishes. The project idea, with abstract if desired, are submitted first for approval. Then, students are provided the author's guide to Journal of Experimental Biology and asked to prepare a formal Abstract, Introduction, and Materials/Methods section as if it were being submitted to the journal. To encourage true group participation, students fill out quantitative evaluation forms for the other people in their group and an average of these scores is factored in to the final project grade.

- Project idea and abstract due Week 10.
- Final project due Week 15.

3.2 Grades & Grading Scale

15% or 15 points Discussion (1.5 points each)

20% or 20 points Quizzes (2 points each)

20% or 20 points Mid-Term exam (Learning modules 1-8)

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4 Course Content

Learning Modules

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1	Introduction and overview
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3	Osmoregulation
4	Thermoregulation
5	Reproduction I
6	Reproduction II
7	Reproduction III
8	Cardiovascular system
9	Muscles
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- Library Help Desk support http://cms.uflib.ufl.edu/ask
- SFRC Academic Hub https://ufl.instructure.com/courses/303721

6.1 Student Life, Wellness, and Counseling Help

- Counseling and Wellness resources http://www.counseling.ufl.edu/cwc/
- U Matter, We Care serves as UF's umbrella program for UF's caring culture and provides students in distress with support and coordination of the wide variety of appropriate resources. Visit http://www.umatter.ufl.edu/ or contact umatter@ufl.edu seven days a week for assistance for students in distress.
- Career Resource Center http://www.crc.ufl.edu/
- Other resources are available at http://www.distance.ufl.edu/getting-help for online students.

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The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

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7 Appendix A – Discussion Readings

Papers describing individual experiments in the discipline. Discussion leaders to choose one paper from those listed or from a literature search with instructor approval.

Topic	Paper(s)
Osmoregulation	
	Disc: Foran et al. Biogenic fish-gut calcium carbonate is a stable amorphous phase in the gilt-head seabream, *Sparus aurata. Sci Reports* 3,1700 (2013): 1-5
Thermoregulation	
	Disc: Armstrong et al. Diel horizontal migration in streams: juvenile fish exploit spatial heterogeneity in thermal and trophic resources. *Ecology* 94 (2013):2066-2075
	Newton et al. Digestive enzyme activities are higher in the shortfin make shark, *Isurus oxyrinchus*, than in ectothermic sharks as a result of visceral endothermy. *Fish Physiol Biochem* (2015): 1-12
Reproduction	
	Disc: Forrester et al. Experimental evidence for density-dependent reproductive output in a coral reef fish. *Popul Ecol* 53 (2011): 155-163
	Donelson et al. Parental condition affects early life-history of a coral reef fish. *J Exp Mar Biol Ecol* 360 (2008): 109-116
Reproduction	
	Disc: Tiersch and Yang. Environmental salinity-induced shifts in sperm motility activation in *Fundulus grandis*. *Aquaculture* 324-325 (2012): 145-150
	Yanagimachi et al. Sperm attractant in the micropyle region of fish and insect eggs. *Biol Reprod* 88 (2013): 1-11
Cardiovascular system	
	Disc: Hicken et al. Sublethal exposure to crude oil during embryonic development alters cardiac

morphology and reduces aerobic capacity in adult fish. *PNAS* 108 (2011): 7086-7090

Digestion and assimilation

Disc: Berens and Murie. Differential digestion and evacuation rates of prey in a warm-temperate grouper. *J Fish Biol* 72 (2008): 1406-1426

McDonald et al. Phylogenetic analysis of microbial communities in different regions of the gastrointestinal tract in *Panaque nigrolineatus*, a wood-eating fish. *PLoS One* 7 (2012): 1-9

Growth

Disc: Jusup et al. A full lifecycle bioenergetic model for bluefin tuna. *PLoS One* 6 (2011): 1-17

Suda et al. Identification and gene expression analyses of ghrelin in the stomach of Pacific bluefin tuna. *Gen Comp Endo* 178 (2012): 89-97

Neuron function and sensory biology

Disc: Kittelberger and Bass. Vocal-motor and auditory connectivity of the midbrain periaqueductal gray in a teleost fish. *J Comp Neuro* 521 (2013): 791-812

Lecchini et al. Variation in brain organization of coral reef fish larvae according to life history traits. *Brain Behav Evo* (2014): 1-14

Immune function

Disc: Parham. How the codfish changed its immune system. *Nature Genetics* 48 (2016): 1103-1104.

Nitrogenous waste

Disc: Barimo and Walsh. Use of urea as a chemosensory cloaking molecule by a bony fish. *J Exp Biol* 209 (2006): 4254-4261.

8 Appendix B – Required Readings

Required reading for each module. Reading are generally book chapters, reviews, or seminal papers in the discipline.

Topic	Paper(s)
Gas exchange/air breathing	Sections I-IV of Evans et al. The multifunctional fish gill. *Physiol Rev* 85 (2005): 97-117
	Nelson. Breaking wind to survive: fishes that breathe air with their gut. *J Fish Biol* 84.3 (2014):554-576
Osmoregulation	**Req:** Section V of Evans et al. The multifunctional fish gill. *Physiol Rev* 85 (2005): 120-130.
	Wilson et al. Intestinal bicarbonate secretion by marine teleost fish – why and how? *Biochim Biophys Act* 1566 (2002): 182-193
	Wilson et al. Contribution of fish to the marine inorganic carbon cycle. *Science* 323 (2009): 359-362
Thermoregulation	**Req:** Wegner et al. Whole-body endothermy in a mesopelagic fish, the opah, *Lampris guttatus*. *Science* 348 (2015): 786-789
Reproduction	**Req:** Pages 9-22 of Miller and Kendall. Chapter 1: Fish Reproduction *in* Early Life History of Marine Fishes (2009) Miller and Nummela eds
Reproduction	**Req:** McBride et al. Energy acquisition and allocation to egg production in relation to fish reproductive strategies. *Fish Fish* 16 (2013): 23-57
Reproduction	**Req:** Brooks et al. Egg quality in fish: what makes a good egg? *Rev Fish Biol Fish* 7 (1997): 387-416.
Cardiovascular system	**Req:** Jensen et al. Evolution of the sinus venosus from fish to human. *J Cardiovasc Dev Dis* 1 (2014): 14-28
	Zaccone et al. Morphology, innervation and its phylogenetic step in the heart of the longnose gar. *Act Zool* 93 (2012): 381-389

Muscles	**Req:**	Coughlin. Aerobic muscle function during steady swimming in fish. *Fish Fish* 3 (2002): 63-78
		Coughlin and Akhtar. Contractile properties of the myotomal muscle of sheepshead. *J Exp Zool* 323 (2015): 169-178
		Thys et al. Longitudinal variation in muscle protein expression and contraction kinetics of largemouth bass axial muscle. *J Exp Biol* 204 (2001): 4249-4257
Digestion and assimilation	**Req:**	Austreng. Digestibility determination in fish using chromic oxide marking. *Aquaculture* 13 (1978): 265-272
		Sheridan. Lipid dynamics in fish. *Comp Biochem Physiol B* 90 (1988): 679-690
		Infante and Cahu. Ontogeny of the gastrointestinal tract of marine fish larvae. *Comp Biochem Physiol C* 130 (2001): 477-487
Growth	**Req:**	Mommsen. Paradigms of growth in fish. *Comp Biochem Physiol B* 129 (2001): 207-219
		Johnston et al. Growth and the regulation of myotomal muscle mass in teleost fish. *J Exp Biol* 214 (2011): 1617-1628
		Bhatta et al. Gonads directly regulate growth in teleosts. *PNAS* 109 (2012): 11408-11412
Neuron function and sensory biology	**Req:**	Eaton et al. The Mauthner cell and other identified neurons of the brainstem escape network of fish. *Prog Neurobio* 63 (2001): 467-485
		Hunt et al. Spectal tuning and molecular evolution of rod visual pigments in the species flock of Cottoid fish in Lake Baikal. *Vision Res* 36 (1996): 1217-1224
Immune function	**Req:**	Tort et al. Fish immune system: a crossroads between innate and adaptive responses. *Immunologia* 22 (2003): 277-286
		Zapata et al. Ontogeny of the immune system of fish. *Fish Shellfish Immun* 20 (2006): 126-136

Lipids and homeoviscous adaptation	**Req:** Hazel. Thermal adaptation in biological membranes: is homeoviscous adaptation the explanation? *Annu Rev Physiol* 57 (1995): 19-42
Nitrogenous waste	**Req:** Bucking et al. Immunohistochemical localization of urea and ammonia transporters in two confamilial fish species, the ureotelic gulf toadfish and the ammoniotelic plainfin midshipman. *Cell Tissue Res* 325 (2013): 623-637

Cover Sheet: Request 12897

FAS6xxx Spatial Sciences for Marine Environmental Characterization

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rhiannon Pollard rhiannon-pollard@ufl.edu
Created	8/2/2018 11:28:37 AM
Updated	8/6/2018 2:21:41 PM
Description of request	Create new course in Fisheries & Aquatic Sciences

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Forest Resources and Conservation 514946000	William Lindberg		8/6/2018
FAS6932_SpatialEnv.docx					8/2/2018
College	Pending	CALS - College of Agricultural and Life Sciences			8/6/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12897

Info

Request: FAS6xxx Spatial Sciences for Marine Environmental Characterization
Description of request: Create new course in Fisheries & Aquatic Sciences
Submitter: Rhiannon Pollard rhiannon-pollard@ufl.edu
Created: 8/2/2018 11:18:40 AM
Form version: 1

Responses

Recommended Prefix FAS
Course Level 6
Number xxx
Category of Instruction Intermediate
Lab Code None
Course Title Spatial Sciences for Marine Environmental Characterization
Transcript Title Marine Spatial Scienc
Degree Type Graduate

Delivery Method(s) On-Campus
Co-Listing No
Co-Listing Explanation n/a
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description An introduction to the geospatial technologies, concepts and methods required to acquire, analyze and manage geographic data used in a context of marine habitat mapping. Emphasis is given to the understanding and appreciation of maps as a mean of communication between stakeholders with different backgrounds and expertise.
Prerequisites n/a
Co-requisites n/a
Rationale and Placement in Curriculum The School of Forest Resources & Conservation hosts both Fisheries and Aquatic Sciences and Geomatics graduate programs, and this course serves both majors. The fields of cartography, remote sensing, and geographic information systems (GIS) will be reviewed, and students will be introduced to quantitative methods relevant to the study of marine geomorphology and biology and how they combine to provide a spatial representation of marine habitats. This is a relatively new, promising career field that students must be able to have experience in.

Course Objectives The overall goal of this course is to improve spatial awareness and map literacy in students. Upon successful completion of the course, students will be able to:

- Describe data collection techniques relevant to marine habitat mapping.
- Explain the different components of marine habitats and how they can be quantified and situated in a geographic context.
- Prepare different types of spatial data for their inclusion in a habitat mapping workflow.
- Evaluate, critically, spatial data and mapping outcomes in given contexts.
- Design a suitable habitat mapping project for a given purpose.

Course Textbook(s) and/or Other Assigned Reading • Recommended: "How to lie with maps, 2nd edition", by Mark Monmonier.

Required Readings (provided in Canvas)
Costa et al. (2009) OR Knudby et al. (2010)
Caquard (2011) OR Wright et al. (1997)
Brown et al. (2011) OR McArthur et al. (2010)
Erikstad et al. (2013) OR Roccinni et al. (2011)
Florinsky (2017) OR Agumya & Hunter (1999)
Greene et al. (2005), Lecours (2017)

Weekly Schedule of Topics 08/28 Course Introduction, Introduction to Maps. Costa et al. (2009) & Knudby et al. (2010).

2 09/04 Remote Sensing. Monmonier (1980) & Wright et al. (1997). Summary #1

3 09/11 Cartography, Geographic Information Systems. Brown et al. (2011) & McArthur et al. (2010). Summary #2

4 09/18 Surrogacy, Marine Habitat Mapping. Erikstad et al. (2013) & Roccinni et al. (2011). Summary #3

5 09/25 Finding Data, Metadata, Data Quality, Fitness-for-Use.

Florinsky (2017) & TBD. Summary #4

6 10/02 Advanced Quantitative Techniques. Summary #5

7 10/09 Mid-term exam

8 10/16 Field Trip

9 10/22 Project Planning

10 10/30 Lab and Team Work

11 11/06 Lightning Talks. Proposal

12 11/13 Communicating with Maps, Stakeholders Involvement. Greene et al. (2005) & Lecours (2017)

13 11/20 Lab and Team Work. Report Part #1

14 11/27 Lab and Team Work. Report Part #2

15 12/04 Project Presentation, Conclusion. Final Report

Links and Policies All UF and CALS required policies are included in the syllabus

Grading Scheme Reading Summaries (3) 5% each (15%)

Mid-Term Exam	10%
3-Pages Project Proposal	15%
Lightning Talk	10%
Final Report	35%
Final Presentation	15%

Grading Scale (%)

A	93-100
A-	90-92.99
B+	87-89.99
B	83-86.99
B-	80-82.99
C+	77-79.99
C-	73-76.99
C	70-72.99
D+	67-69.99
D	63-66.99
D-	60-62.99
E	< 60

Instructor(s) Dr. Vincent Lecours

Spatial Sciences for Marine Environmental Characterization- FAS 6932

1 Overview

An introduction to the geospatial technologies, concepts and methods required to acquire, analyze and manage geographic data used in a context of marine habitat mapping. Emphasis is given to the understanding and appreciation of maps as a mean of communication between stakeholders with different backgrounds and expertise.

- 3 Credits
- Fall
- Face-to-face with Canvas
- Reed Lab, Room 302

The fields of cartography, remote sensing, and geographic information systems (GIS) will be reviewed, and students will be introduced to quantitative methods relevant to the study of marine geomorphology and biology and how they combine to provide a spatial representation of marine habitats.

Course Prerequisites: none

Instructor: Instructor: Vincent Lecours, Ph.D. **Email:** vlecours@ufl.edu, **Office**: FAS Millhopper Facility, Room 12. **Phone**: (352) 273-3617

- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email or phone; office visits available by appointment.

Textbook(s) and/or readings:

- Required readings will be provided; see list under "Readings."
- Recommended: "How to lie with maps, 2nd edition", by Mark Monmonier.

2 Learning Outcomes

The overall goal of this course is to improve spatial awareness and map literacy in students. Upon successful completion of the course, students will be able to:

- Describe data collection techniques relevant to marine habitat mapping.
- Explain the different components of marine habitats and how they can be quantified and situated in a geographic context.
- Prepare different types of spatial data for their inclusion in a habitat mapping workflow.
- Evaluate, critically, spatial data and mapping outcomes in given contexts.
- Design a suitable habitat mapping project for a given purpose.

3 Course Logistics

Course concepts will be introduced using real examples to demonstrate how spatial sciences can assist in answering marine sciences questions. This course has a lab and field-based components in which students will learn how to collect spatial data and to perform GIS-based marine environmental characterization. The in-class time will be focused on discussions and building skillsets like spatial critical thinking and science communication. A series of assignments and in-class tasks will provide students with the opportunity to use spatial data and maps for both interpretation and analysis.

Technology Requirements:

The course will use a variety of GIS software, including open-source software that can be downloaded on any desktop computer and laptop, and the commercial ESRI ArcGIS Desktop software. ArcGIS is available through the following resources:

- Getting a license from the UF GeoPlan Center (https://www.geoplan.ufl.edu/licensed_software.shtml),
- UF computer labs (https://labs.at.ufl.edu/ ; note that the labs may be reserved for classes),
- Remotely from the UFApps (https://info.apps.ufl.edu/).

The course will also use a course website in Canvas for the submission of assignments. Technology for Canvas include:

- A computer or mobile device with high-speed internet connection.
- A headset and/or microphone and speakers; a web cam is suggested.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. What browser am I using?

3.1 Assignments & Deliverables

All assignments will be submitted on the course website in Canvas. Presentation of the assignments must be neat, logical, organized and appropriately referenced. Poor presentation will be penalized up to a maximum of 20% of the value of assignments and exams.

Reading Summaries

Readings will be provided throughout the semester. Students are expected to write a short summary of their assigned readings in preparation for class discussion. Five opportunities will be provided to write such summary; students have to submit at least three summaries over the course of the semester. If a student submits more than three summaries, the three with the highest grades will be counted.

Quizzes & Exams

A comprehensive mid-term exam will be given to assess the students' ability to describe data collection techniques relevant to marine habitat mapping and explain the different components of marine habitats and how they can be quantified and situated in a geographic context.

Team Project

A team project will be assigned in the second half of the semester. Students will be asked to conduct a habitat mapping project in order to assess their ability to prepare different types of spatial data for their inclusion in a habitat mapping workflow, critically evaluate spatial data and mapping outcomes, and design a proper habitat mapping project. The evaluation of the project will be based on an oral (two presentations, 25% of the overall grade) and a written component (two reports, 50% of the overall grade). The final report will be submitted in sections, on which students will receive feedback and have the opportunity to get back partial grades if the feedback is integrated into the final version of the report.

- Four parts: Written Proposal – Lightning Talk – Written Final Report – Final Presentation

3.2 Grades & Grading Scale

Reading Summaries (3)	5% each (15%)
Mid-Term Exam	10%
3-Pages Project Proposal	15%
Lightning Talk	10%
Final Report	35%
Final Presentation	15%

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Grading Scale (%)
A 93-100
A- 90-92.99
B+ 87-89.99
B 83-86.99
B- 80-82.99
C+ 77-79.99
C- 73-76.99
C 70-72.99
D+ 67-69.99
D 63-66.99
D- 60-62.99
E < 60

4 Course Content

Learning Modules

1 08/28 Course Introduction, Introduction to Maps. Costa et al. (2009) & Knudby et al. (2010).

2 09/04 Remote Sensing. Monmonier (1980) & Wright et al. (1997). Summary #1

3 09/11 Cartography, Geographic Information Systems. Brown et al. (2011) & McArthur et al. (2010). Summary #2

4 09/18 Surrogacy, Marine Habitat Mapping. Erikstad et al. (2013) & Roccinni et al. (2011). Summary #3

5 09/25 Finding Data, Metadata, Data Quality, Fitness-for-Use. Florinsky (2017) & TBD. Summary #4

6 10/02 Advanced Quantitative Techniques. Summary #5

7 10/09 Mid-term exam

8 10/16 Field Trip

9 10/22 Project Planning

10 10/30 Lab and Team Work

11 11/06 Lightning Talks. Proposal

12 11/13 Communicating with Maps, Stakeholders Involvement. Greene et al. (2005) & Lecours (2017)

13 11/20 Lab and Team Work. Report Part #1

14 11/27 Lab and Team Work. Report Part #2

15 12/04 Project Presentation, Conclusion. Final Report

5 Readings

Weeks	Dates	Topics	Readings	Assignments
1	08/28	Course Introduction, Introduction to Maps	Costa et al. (2009) OR Knudby et al. (2010)	
2	09/04	Remote Sensing	Caquard (2011) OR Wright et al. (1997)	Summary #1
3	09/11	Cartography, Geographic Information Systems	Brown et al. (2011) OR McArthur et al. (2010)	Summary #2
4	09/18	Surrogacy, Marine Habitat Mapping	Erikstad et al. (2013) OR Roccinni et al. (2011)	Summary #3
5	09/25	Finding Data, Metadata, Data Quality, Fitness-for-Use	Florinsky (2017) OR Agumya & Hunter (1999)	Summary #4
6	10/02	Advanced Quantitative Techniques		Summary #5
7	10/09	*Mid-term exam*		
8	10/16	Field Trip		
9	10/22	Project Planning		
10	10/30	Lab and Team Work		
11	11/06	*Lightning Talks*		Proposal
12	11/13	Communicating with Maps, Stakeholders Involvement	Greene et al. (2005), Lecours (2017)	
13	11/20	Lab and Team Work		Report Part #1
14	11/27	Lab and Team Work		Report Part #2
15	12/04	*Project Presentation*, Conclusion		Final Report

Agumya, A., and G.J. Hunter (1999) A risk-based approach to assessing the 'fitness for use' of spatial data. *Journal of the Urban and Regional Information Systems Association*, 11(1), 33-44.

Brown, C.J., Smith, S.J., Lawton, P., and J.T. Anderson (2011) Benthic habitat mapping: a review of progress towards improved understanding of the spatial ecology of the seafloor using acoustic techniques. *Estuarine, Coastal and Shelf Science*, 92, 502-520.

Caquard, S. (2011) Cartography I: mapping narrative cartography. *Progress in Human Geography*, 37(1), 135-144.

Costa, B.M., Battista, T.A., and S.J. Pittman (2009) Comparative evaluation of airborne LiDAR and ship-based multibeam SoNAR bathymetry and intensity for mapping coral reef ecosystem. *Remote Sensing of Environment*, 113, 1082-1100.

Erikstad, L., Bakkestuen, V., Bekkby, T., and R. Halvorsen (2013) Impact of scale and quality of digital terrain models on predictability of seabed terrain types. *Marine Geodesy*, 36(1), 2-21.

Florinsky, I.V. (2017) An illustrated introduction to general geomorphometry. *Progress in Physical Geography*, 41(6), 723-752.

Greene, G.H., Bizarro, J.J., Tilden, J.E., Lopez, H.L., and M.D. Erdey (2005) The benefits and pitfalls of geographic information systems in marine benthic habitat mapping. *In*: Wright, D.J. and A.J. Scholz (eds.) *Place matters: Geospatial tools for marine science, conservation, and management in the Pacific northwest*, pp. 34–46. Corvallis: Oregon State University Press.

Knudby, A., LeDrew, E., and A. Brenning (2010) Predictive mapping of reef fish species richness, diversity and biomass in Zanzibar using IKONOS imagery and machine-learning techniques. *Remote Sensing of Environment*, 114(6), 1230-1241.

Lecours, V. (2017) On the use of maps and models in habitat mapping and species distribution models. *Frontiers in Marine Science*, 4(288), 1-18.

McArthur, M.A., Brooke, B.P., Przeslawski, R., Ryan, D.A., Lucieer, V.L., Nichol, S., McCallum, A.W., Mellin, C., Cresswell, I.D., and L.C. Radke (2010) On the use of abiotic surrogates to describe marine benthic biodiversity. *Estuarine, Coastal and Shelf Science*, 88, 21-32.

Rocchini, D., Hortal, J., Lengyel, S., Lobo, J.M., Jiménez-Valverde, A., Ricotta, C., Bacaro, G., and A. Chiarucci (2011) Accounting for uncertainty when mapping species distributions: the need for maps of ignorance. *Progress in Physical Geography*, 35(2), 211-226.

Wright, D.J., Fox, C.G., and A.M. Bobbitt (1997) Scientific information model for deepsea mapping and sampling. *Marine Geodesy*, 20(4), 367-379.

6 Policies and Requirements

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

6.1 Late Submissions & Make-up Requests

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

Except in circumstances covered by UF policy, a deduction of 10% will be made for each day that an assignment is late, with the first 10% being removed immediately after the due time. Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

6.2 Semester Evaluation Process

Your comments are very valuable to the instructor. They will be used by the instructor to make specific improvements to the course (e.g. assignments) and teaching style. The instructor will be providing opportunities throughout the semester for students to provide direct feedback on the course. However, students are encouraged to email the instructor at any time if they have concerns or comments to share with the instructor.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required, but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide UF with feedback on the quality of instruction in this course using a standard set of university and college criteria (UF Faculty Evaluations). These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

6.3 Expectations of Course Behavior

You are expected to actively engage in the course throughout the semester. You must come to class prepared by completing all out-of-class assignments. This preparation gives you the knowledge or practice needed to engage in higher levels of learning during the live class sessions. If you are not prepared for the face-to-face sessions, you may struggle to keep pace with the activities occurring in the live sessions, and it is unlikely that you will reach the higher learning goals of the course. Similarly, you are expected to actively participate in the live class. Your participation fosters a rich course experience for you and your peers that facilitates overall mastery of the course objectives.

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office. http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

6.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless them instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes,

exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

6.5 University Policy on Accommodating Students with Disabilities:

Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

6.6 Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

6.7 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

> *The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.*

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: http://multicultural.ufl.edu.

7 Getting Help

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | http://elearning.ufl.edu
- Library Help Desk support http://cms.uflib.ufl.edu/ask
- SFRC Academic Hub https://ufl.instructure.com/courses/303721

7.1 Student Life, Wellness, and Counseling Help

- Counseling and Wellness resources http://www.counseling.ufl.edu/cwc/
- U Matter, We Care serves as UF's umbrella program for UF's caring culture and provides students in distress with support and coordination of the wide variety of appropriate resources. Visit http://www.umatter.ufl.edu/ or contact umatter@ufl.edu seven days a week for assistance for students in distress.
- Career Resource Center http://www.crc.ufl.edu/
- Other resources are available at http://www.distance.ufl.edu/getting-help for online students.

7.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: http://www.distance.ufl.edu/student-complaint-process
- Students in face-to-face courses: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

(5)

Cover Sheet: Request 12900

FAS6xxx Fisheries Enhancement

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rhiannon Pollard rhiannon-pollard@ufl.edu
Created	8/2/2018 1:40:42 PM
Updated	8/6/2018 2:11:42 PM
Description of request	Create new course in Fisheries and Aquatic Sciences

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Forest Resources and Conservation 514946000	William Lindberg		8/6/2018
FAS6xxx_FisheriesEnhancement.docx					8/2/2018
College	Pending	CALS - College of Agricultural and Life Sciences			8/6/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12900

Info

Request: FAS6xxx Fisheries Enhancement
Description of request: Create new course in Fisheries and Aquatic Sciences
Submitter: Rhiannon Pollard rhiannon-pollard@ufl.edu
Created: 8/2/2018 1:09:50 PM
Form version: 1

Responses

Recommended Prefix FAS
Course Level 6
Number xxx
Category of Instruction Intermediate
Lab Code None
Course Title Fisheries Enhancement
Transcript Title Fisheries Enhancement
Degree Type Graduate

Delivery Method(s) Online, On-Campus
Co-Listing No
Co-Listing Explanation n/a
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 2

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 2
Course Description Provides participants with knowledge and skills required for assessing where and when enhancements can contribute to fisheries management goals, and for developing and managing such initiatives effectively. Emphasizes integrative systems approaches and the key elements of population dynamics, aquaculture production, release strategies, genetic management, governance, and social/economic costs and benefits.
Prerequisites none
Co-requisites none
Rationale and Placement in Curriculum Fisheries enhancements are a set of fisheries management approaches involving the release of cultured organisms to enhance or restore fisheries. If developed under suitable conditions and managed appropriately, enhancements can contribute effectively to fisheries management goals. On the other hand, poorly conceived and managed enhancements can be wasteful of resources, and may even exacerbate existing fisheries problems. Students in fisheries and aquatic sciences must be competent in addressing these kinds of problems, especially those interested in integrative management.
Course Objectives At the end of the course the participants will be able to:

- Describe the scientific basis of fisheries enhancements
- Determine conditions under which enhancements may contribute to fisheries and ecosystem management goals
- Evaluate the performance of existing fisheries enhancements
- Plan for the development of new, or the reform of existing fisheries enhancements

Course Textbook(s) and/or Other Assigned Reading Lorenzen, K. (2014) Understanding and managing enhancements: why fisheries scientists should care. Journal of Fish Biology 85: 1807-1829.

Lorenzen, K., Leber, K.M. & Blankenship, H.L. Responsible approach to marine stock enhancement: an update. Reviews in Fisheries Science 18: 189-210. (2010)

Paquet, P. J. Flagg, T. Appleby, A. Barr, J. Blankenship, L. Campton, D. Delarm, M. Evelyn, T. Fast, D. Gislason, J. Kline, P. Maynard, D. Mobrand, L. Nandor, G. Seidel, P. & Smith, S. (2011) Hatcheries, Conservation, and Sustainable Fisheries—Achieving Multiple Goals: Results of the Hatchery Scientific Review Group's Columbia River Basin Review. Fisheries 36(11): 547-561.

Lorenzen, K. (2005) Population dynamics and potential of fisheries stock enhancement: practical theory for assessment and policy analysis. Philosophical Transactions of the Royal Society B 360: 171-189.

Lorenzen, K. (2006) Population management in fisheries enhancement: gaining key information from release experiments through use of a size-dependent mortality model. Fisheries Research 80: 19-27.

Medley, P.A.H. & Lorenzen, K. (2006) EnhanceFish: A decision support tool for aquaculture-based fisheries enhancement. Open-source freeware, available from http://fisheriessolutions.org/projects/enhancefish/

management of domestication and interactions with wild fish. Biological Reviews 87: 639-660.

Olla, B. L., M. W. Davis and C. H. Ryer. (1998) Understanding how the hatchery environment represses or promotes the development of behavioral survival skills. Bulletin of Marine Science 62: 531-550.

Tringali, M. D., T. M. Bert, F. Cross, J. W. Dodrill, L . M. Gregg, W. G. Halstead, R. A. Krause, K. M. Leber, K. Mesner, W. Porak, D. Roberts, R. Stout and D. Yeager (2007) Genetic Policy for the Release of Finfishes in Florida. Florida Fish and Wildlife Conservation Commission, Florida.

Whitmarsh, D. (2001) Economic analysis of marine ranching. CEMARE Research Paper 152, 22 pp.

Leber, K. M., N. P. Brennan and S. M. Arce. (1998) Recruitment patterns of juvenile, cultured Pacific threadfin, Polydactylus sexfilis (Polynemidae), released along sandy marine shores in Hawaii. Bulletin of Marine Science 62(2):389-408.

Leber, K. M. and H. L. Blankenship. 2011. How Advances in Tagging Technology Improved Progress in a New Science: Marine Stock Enhancement. American Fisheries Society Symposium 76:1-12.

Leber, K.M. (2013) Marine fisheries enhancement: Coming of age in the new millennium. In: Paul Christou et al. (eds) Sustainable Food Production. DOI 10.1007/978-1-4614-5797-8, Springer Science+Business Media, New York.

Weekly Schedule of Topics Course overview (K. Lorenzen)
Overview of course.

Lecture 1: Introduction to fisheries enhancements and the 'Responsible Approach' (K. Lorenzen)
Definition and status of fisheries enhancements, typology of enhancement systems: restocking, stock enhancement, etc.; Responsible Approach.

Lecture 2: Understanding enhancement fisheries systems (K. Lorenzen)
Why we need to understand enhancement fisheries systems; what can we learn from case studies?, components of enhancement fisheries system; framework for analysis; application of framework.

Lecture 3: Population dynamics and quantitative assessment of stocked fisheries (K. Lorenzen)
Fish life histories and population dynamics; a basic stock enhancement model; dynamics of ranching, stock enhancement, restocking, etc.; quantitative assessment; how to get the data: comparative studies, stock assessments, release experiments. Tutorial 1: Population dynamics and quantitative assessment (K. Lorenzen)
Students use the EnhanceFish package to analyze the dynamics of case study fisheries.

Lecture 4: Aquaculture production for fisheries enhancement (K. Lorenzen)
Fish culture, domestication and feralization; managing domestication effects; promoting seed quality: environmental enrichment, life skills training, etc.; transport and release.

Lectures 5 & 6: Genetic resource management for programs of stock enhancement and restocking (M.D. Tringali)
Evolution and genetic structure of wild and cultured fish populations; genetic impacts of transfer into aquaculture; alternative goals of management; genetic management for stock enhancement and conservation; genetic management for culture-based fisheries and ranching; genetic impacts of releases on natural populations; overview of FL genetics policy.

Lecture 7: Economic and social analysis of enhancements (C.M. Adams)
Economic analysis of fisheries enhancements, recreational fisheries, impacts on livelihoods

Lectures 8 & 9: Release strategies, empirical evaluation and the use of tagging programs (K.M. Leber)
Historical approaches to planning release strategies; release variables: critical uncertainties; experimental assessment of release strategies; empirical generalizations about release success; challenges to implementing responsible release strategies.
Tutorial 2: Planning ahead: future development of enhancements in the participant's fisheries (K.lorenzen, K.M. Leber)

Lecture 7: History of enhancement (K.M. Leber)
History of marine fisheries enhancements and the development of enhancement science.

Workshop 6: Review and discussion of draft summaries and recommendations (K. Lorenzen, K.M. Leber).
Links and Policies All UF and CALS policies are included in the syllabus
Grading Scheme Discuss and confirm case study and syllabus 5%

System overview & governance presentation	15%
Quantitative assessment presentation	15%
EnhanceFish Exercise	5%
Genetics & aquaculture presentation	15%
Genetics Exercise	5%
Release strategy and ecological impacts presentation	15%
Summary of assessment and recommendations	15%
Participation in class	10%

Grades will be allocated as: A (93 - 100 %), A- (90 - 92 %), B+ (86 - 89 %), B (82 - 85 %), B- (78 - 81 %), C+ (74 -77 %), C (67 - 73 %), C- (63 - 66 %), D+ (59 - 62 %), D (55 - 58 %), D- (51 - 54 %), E (< 50 %).

Instructor(s) Dr. Kai Lorenzen

Fisheries Enhancement - FAS 6xxx

1 Overview

Provides participants with knowledge and skills required for assessing where and when enhancements can contribute to fisheries management goals, and for developing and managing such initiatives effectively. Emphasizes integrative systems approaches and the key elements of population dynamics, aquaculture production, release strategies, genetic management, governance, and social/economic costs and benefits.

Fisheries enhancements are a set of fisheries management approaches involving the release of cultured organisms to enhance or restore fisheries. If developed under suitable conditions and managed appropriately, enhancements can contribute effectively to fisheries management goals. On the other hand, poorly conceived and managed enhancements can be wasteful of resources, and may even exacerbate existing fisheries problems. Lectures and discussions are used to introduce students to key concepts and methods within the framework of the 'updated responsible approach' to fisheries enhancement (Lorenzen et al., Rev. Fish. Sci. 18: 189-210, 2010). Throughout the course, students apply those concepts and methods to an enhancement fishery case study of their choice and present results of their assessments orally and in writing.

- 2 Credits
- Summer A
- Online (synchronous) and on-campus
- http://elearning.ufl.edu/

Course Prerequisites: none

Instructor: Dr. Kai Lorenzen (Professor), Fisheries and Aquatic Sciences, SFRC, 7922 71st Street, Gainesville, FL 32653; Phone 352-273 3646; Email: klorenzen@ufl.edu . http://fisheriessolutions.org/

- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email or phone; office visits available by appointment.

Guest Lecturers

Dr. Charles M. Adams (Professor), Food and Resource Economics Department, University of Florida, McCarty Hall. Email: cmadams@ufl.edu

Dr. Kenneth M. Leber (UF Courtesy Professor), Associate Vice President, Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota, FL 34236. Phone: 941-388-4441 x406
Email: KLeber@mote.org

Dr. Michael D. Tringali (UF Courtesy Associate Professor), Research Scientist (Genetics), Florida Fish & Wildlife Conservation Commission, 100 Eighth Avenue S.E., St. Petersburg, FL 33701. Phone: 727- 896-8626. Email: mike.tringali@myfwc.com

Textbook(s) and/or readings: There is no required text for the course. Online readings will be provided for each learning topic as listed below.

2 Learning Outcomes

At the end of the course the participants will be able to:

- Describe the scientific basis of fisheries enhancements
- Determine conditions under which enhancements may contribute to fisheries and ecosystem management goals
- Evaluate the performance of existing fisheries enhancements
- Plan for the development of new, or the reform of existing fisheries enhancements

3 Course Logistics

Classes will consist of lectures with discussions, independent coursework, and workshops. Throughout the course, students will analyze and prepare a development plan for a fisheries enhancement of their choice. The case study enhancement may be already operational, in development, or proposed.

Students must upload a personal introduction clip and workshop presentations via the VoiceThread system and participate in a weekly online, synchronous discussion meeting that will be scheduled at the start of class. All lectures and tutorial are available as Mediasite recordings.

Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A headset and/or microphone and speakers; a web cam is suggested.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. What browser am I using?
- Voicethread: http://ufl.voicethread.com (more instructions will be provided if used)
- Zoom videoconferencing will be available in Canvas and instructions will be provided.

3.1 Assignments & Deliverables

Initial discussion on course requirements and choice of case study enhancement

Discuss the course work requirements and your choice of case study enhancement with the instructor, in person or by telephone or Skype. Confirm by email that you have discussed and understood the course requirements, and your choice of case study enhancement.

Grading criteria: Comprehension of coursework requirements, consideration of criteria for selecting a case study enhancement, student is proactive in identifying a case study and seeking clarification of requirements and criteria as appropriate.

Presentations of case study analyses

Prepare and present analyses on the following aspects of your case study enhancement:

- System overview & governance
- Quantitative assessment

- Genetics & aquaculture
- Release strategy and ecological impacts

Further guidance on the analyses will be given in the lectures and tutorials. Each analysis should be presented in the relevant workshop as a 10 minute presentation to be uploaded VoiceThread that will be replayed in class and discussed.

Grading criteria: Presentations provides a good overview of analyses and results. A systematic effort to locate information on the case study enhancement and a rigorous approach to analysis are evident. The presentation is structured and presented clearly. Deadlines: Presentations must be uploaded to VoiceThread by Thursday night in week they are due.

Review and discussion of presentations

All presentations will be reviewed and discussed by all students and the relevant instructors. Review comments can be made in VoiceThread and/or in the Canvas discussion room.

Executive summary of assessment and recommendations

Present a succinct written summary of the analyses you have conducted on your case study enhancement during the course labs. Outline your suggestions for the further development or reform of your case study enhancement. The report will draw mostly on the material already presented orally during the course week (4 pages maximum)

Grading criteria: Synthesis provides evidence of competent application of concepts and methods learned during the course to the case study enhancement.

Exercises

Submit written answers to short exercises on:

- EnhanceFish modeling
- Population genetics

Participation in Class

Students are expected to participate actively and constructively in class.

Grading criteria: Students make regular constructive contributions by reviewing and discussing presentations and participating in the synchronous voice discussion group sessions.

3.2 Grades & Grading Scale

Discuss and confirm case study and syllabus	5%
System overview & governance presentation	15%
Quantitative assessment presentation	15%
EnhanceFish Exercise	5%
Genetics & aquaculture presentation	15%
Genetics Exercise	5%
Release strategy and ecological impacts presentation	15%
Summary of assessment and recommendations	15%

Participation in class 10%

Grades will be allocated as: A (93 - 100 %), A- (90 - 92 %), B+ (86 - 89 %), B (82 - 85 %), B- (78 - 81 %), C+ (74 -77 %), C (67 - 73 %), C- (63 - 66 %), D+ (59 - 62 %), D (55 - 58 %), D- (51 - 54 %), E (< 50 %).

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

4 Course Content

Date	Lectures, labs and activities
Week 1 starting 5/8/2017	Lectures to watch: Course overview (K. Lorenzen) Lecture 1: Introduction to fisheries enhancements and the 'Responsible Approach' (K. Lorenzen) Lecture 2: Understanding enhancement fisheries systems (K. Lorenzen)
	Things to do (Deadline: 5/11/2017, 23:59 pm): • Upload personal introduction clip to VoiceThread • Select case study enhancement and collate basic information on it • Confirm case study selection and understanding of course requirements with instructor (telephone or Skype) • Upload introduction to your case study to VoiceThread
Week 2 starting 5/15/2017	Lectures to watch: Lecture 3: Population dynamics and quantitative assessment of stocked fisheries (K. Lorenzen) Tutorial 1: Population dynamics and quantitative assessment of stocked fisheries (K. Lorenzen) Lecture 4: Aquaculture production for enhancement (K. Lorenzen)
	Things to do (Deadline: 5/18/2017, 23:59 pm): • Check out the other participant's introduction clips • Provide feedback on other student's presentation on VoiceThread and/or in chat room • Upload system overview & governance presentation on VoiceThread
Week 3 starting 5/22/2017	Lectures to watch: Lecture 5: Genetic aspects of fisheries enhancement & genetic resource management I (M.D. Tringali)

	Lecture 6: Genetic aspects of fisheries enhancement & genetic resource management II (M.D. Tringali) Lecture 7: Economic and social analysis of enhancements (C.M. Adams)
	Things to do (Deadline: 5/25/2017, 23:59 pm): • Provide feedback on other student's presentation on VoiceThread and/or in chat room • Upload quantitative assessment presentation on VoiceThread • Submit EnhanceFish modeling exercise as Word Doc on Canvas
Week 4 starting 5/29/2017	Lectures to watch: Lecture 8: Release strategies, empirical evaluation and the use of tagging programs (K.M. Leber) Lecture 9: Release strategies, empirical evaluation and the use of tagging programs (K.M. Leber)
	Things to do (Deadline: 6/1/2017, 23:59 pm): • Provide feedback on other student's presentation on VoiceThread and/or in chat room • Upload genetics and aquaculture presentation on VoiceThread • Submit genetics exercise as Word Doc on Canvas
Week 5 starting 6/5/2017	Lectures to watch/attend: Lecture 10: History of enhancement (K.M. Leber) Panel discussion: Case study review and discussion of draft summaries and recommendations (all instructors). Held on 6/9/2017, 10:00 am – 3:00 pm, at Newins-Ziegler Hall 222, University of Florida. (Optional attendance in person or via online communication. Session will be recorded and become available for viewing after 4 pm).
	Things to do (Deadline: 6/8/2017, 23:59 pm): • Provide feedback on other student's presentation on VoiceThread and/or in chat room • Upload release strategy and ecological impacts presentation on VoiceThread • Submit draft summary of assessment and recommendations as Word Doc on Canvas
Week 6 starting 6/12/2017	Things to do (Deadline: 6/15/2016, 23:59 pm): Submit final summary of analyses and recommendations together with powerpoint files of all your presentation by email to klorenzen@ufl.edu

4.1 Course Schedule Details and Key Readings

Week 1

Select case study enhancement. Confirm case study selection and understanding of course requirements with instructor. Collate basic information on case study fishery and prepare initial presentation.

Selection of case study: You may select any fisheries enhancement, located anywhere in the world, whether proposed, in development, or fully operational. The only requirement is that you should be able to gain good information on this fishery enhancement from published material, professional contacts (e.g. fisheries or hatchery managers, scientists), or your own professional work. Different types of information will be available for different fisheries: for some proposed marine enhancements, there may quantitative assessments of the wild stock but not experimental hatchery or release data. For others, there may be experimental release data but little information on the wild stock or the fishery. It is fine if the information available for your case study fishery is unbalanced in this way (you will develop plausible scenarios and research plans for areas where the information is limited), but DO NOT select a case study for which there is very little information on anything! A Fisheries Enhancement Case Study Information Checklist is provided to help you with information collection.

Course overview (K. Lorenzen)
Overview of course.

Lecture 1: Introduction to fisheries enhancements and the 'Responsible Approach' (K. Lorenzen)
Definition and status of fisheries enhancements, typology of enhancement systems: restocking, stock enhancement, etc.; Responsible Approach.

> Lorenzen, K. (2014) Understanding and managing enhancements: why fisheries scientists should care. Journal of Fish Biology 85: 1807-1829.
> Lorenzen, K., Leber, K.M. & Blankenship, H.L. Responsible approach to marine stock enhancement: an update. Reviews in Fisheries Science 18: 189-210. (2010)
>
> Paquet, P. J. Flagg, T. Appleby, A. Barr, J. Blankenship, L. Campton, D. Delarm, M. Evelyn, T. Fast, D. Gislason, J. Kline, P. Maynard, D. Mobrand, L. Nandor, G. Seidel, P. & Smith, S. (2011) Hatcheries, Conservation, and Sustainable Fisheries—Achieving Multiple Goals: Results of the Hatchery Scientific Review Group's Columbia River Basin Review. Fisheries 36(11): 547-561.

Lecture 2: Understanding enhancement fisheries systems (K. Lorenzen)
Why we need to understand enhancement fisheries systems; what can we learn from case studies?, components of enhancement fisheries system; framework for analysis; application of framework.

> Lorenzen, K. (2008) Understanding and managing enhancement fisheries systems. Reviews in Fisheries Science 16:10-23.

Week 2

Lecture 3: Population dynamics and quantitative assessment of stocked fisheries (K. Lorenzen)

Fish life histories and population dynamics; a basic stock enhancement model; dynamics of ranching, stock enhancement, restocking, etc.; quantitative assessment; how to get the data: comparative studies, stock assessments, release experiments.

Lorenzen, K. (2005) Population dynamics and potential of fisheries stock enhancement: practical theory for assessment and policy analysis. Philosophical Transactions of the Royal Society B 360: 171-189.

Lorenzen, K. (2006) Population management in fisheries enhancement: gaining key information from release experiments through use of a size-dependent mortality model. Fisheries Research 80: 19-27.

Tutorial 1: Population dynamics and quantitative assessment (K. Lorenzen)
Students use the *EnhanceFish* package to analyze the dynamics of case study fisheries.

Medley, P.A.H. & Lorenzen, K. (2006) EnhanceFish: A decision support tool for aquaculture-based fisheries enhancement. Open-source freeware, available from http://fisheriessolutions.org/projects/enhancefish/

Lecture 4: Aquaculture production for fisheries enhancement (K. Lorenzen)
Fish culture, domestication and feralization; managing domestication effects; promoting seed quality: environmental enrichment, life skills training, etc.; transport and release.

Lorenzen, K., Beveridge, M.C.M. & Mangel, M. (2012) Cultured fish: integrative biology and management of domestication and interactions with wild fish. Biological Reviews 87: 639-660.

Olla, B. L., M. W. Davis and C. H. Ryer. (1998) Understanding how the hatchery environment represses or promotes the development of behavioral survival skills. Bulletin of Marine Science 62: 531-550.

Week 3

Lectures 5 & 6: Genetic resource management for programs of stock enhancement and restocking (M.D. Tringali)

Evolution and genetic structure of wild and cultured fish populations; genetic impacts of transfer into aquaculture; alternative goals of management; genetic management for stock enhancement and conservation; genetic management for culture-based fisheries and ranching; genetic impacts of releases on natural populations; overview of FL genetics policy.

Tringali, M. D., T. M. Bert, F. Cross, J. W. Dodrill, L . M. Gregg, W. G. Halstead, R. A. Krause, K. M. Leber, K. Mesner, W. Porak, D. Roberts, R. Stout and D. Yeager (2007) Genetic Policy for the Release of Finfishes in Florida. Florida Fish and Wildlife Conservation Commission, Florida.

Lecture 7: Economic and social analysis of enhancements (C.M. Adams)
Economic analysis of fisheries enhancements, recreational fisheries, impacts on livelihoods

Whitmarsh, D. (2001) Economic analysis of marine ranching. CEMARE Research Paper 152, 22 pp.

Week 4

Lectures 8 & 9: Release strategies, empirical evaluation and the use of tagging programs (K.M. Leber)
Historical approaches to planning release strategies; release variables: critical uncertainties; experimental assessment of release strategies; empirical generalizations about release success; challenges to implementing responsible release strategies

Leber, K. M., N. P. Brennan and S. M. Arce. (1998) Recruitment patterns of juvenile, cultured Pacific threadfin, *Polydactylus sexfilis* (Polynemidae), released along sandy marine shores in Hawaii. Bulletin of Marine Science 62(2):389-408.

Leber, K. M. and H. L. Blankenship. 2011. How Advances in Tagging Technology Improved Progress in a New Science: Marine Stock Enhancement. American Fisheries Society Symposium 76:1-12.

Tutorial 2: Planning ahead: future development of enhancements in the participant's fisheries (K.lorenzen, K.M. Leber)

Development approaches; programmed vs. adaptive implementation; engaging stakeholders; decision making; monitoring and adaptive management. Participants set out priorities for management, research, planning of their case study enhancements.

Week 5

Lecture 7: History of enhancement (K.M. Leber)
History of marine fisheries enhancements and the development of enhancement science.

Leber, K.M. (2013) Marine fisheries enhancement: Coming of age in the new millennium. *In:* Paul Christou et al. (eds) *Sustainable Food Production*. DOI 10.1007/978-1-4614-5797-8, Springer Science+Business Media, New York.

Workshop 6: Review and discussion of draft summaries and recommendations (K. Lorenzen, K.M. Leber).

5 Policies and Requirements

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

5.1 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course.

[add more if desired]

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

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

5.2 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required, but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide UF with feedback on the quality of instruction in this course using a standard set of university and college criteria (UF Faculty Evaluations). These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

5.3 Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office. http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

5.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless them instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

5.5 University Policy on Accommodating Students with Disabilities:

Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

5.6 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

> *The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.*

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: http://multicultural.ufl.edu.

5.7 Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

6 Getting Help

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- Learning-support@ufl.edu | (352) 392-HELP - select option 2 | http://elearning.ufl.edu
- Library Help Desk support http://cms.uflib.ufl.edu/ask
- SFRC Academic Hub https://ufl.instructure.com/courses/303721

6.1 Student Life, Wellness, and Counseling Help

- Counseling and Wellness resources http://www.counseling.ufl.edu/cwc/
- U Matter, We Care serves as UF's umbrella program for UF's caring culture and provides students in distress with support and coordination of the wide variety of appropriate resources. Visit http://www.umatter.ufl.edu/ or contact umatter@ufl.edu seven days a week for assistance for students in distress.
- Career Resource Center http://www.crc.ufl.edu/
- Other resources are available at http://www.distance.ufl.edu/getting-help for online students.

6.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: http://www.distance.ufl.edu/student-complaint-process
- Students in face-to-face courses: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

Cover Sheet: Request 12689

SWS 5XXX - Aquatic Toxicology: Science and Applications

Info

Process	Course|New|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Michael Sisk mjsisk@ufl.edu
Created	5/11/2018 3:31:54 PM
Updated	5/11/2018 3:43:21 PM
Description of request	New Graduate Course in Soil and Water Sciences Department

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Soil and Water Science 514921000	Konda Reddy		5/11/2018
SWS_5XXX_Aquatic_Toxicology_5_11_18.pdf					5/11/2018
SWS_4XXX_Aquatic_Toxicology_5_11_18.pdf					5/11/2018
Joint_Letter_Undergraduate_&_Graduate Coordinator.pdf					5/11/2018
UF_Env_Engineering_UCC_Consult_Aquatic_Toxicology.pdf					5/11/2018
UF_PHHP_UCC_Consult_Aquatic_Toxicology.pdf					5/11/2018
College	Pending	CALS - College of Agricultural and Life Sciences			5/11/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|New for request 12689

Info

Request: SWS 5XXX - Aquatic Toxicology: Science and Applications
Description of request: New Graduate Course in Soil and Water Sciences Department
Submitter: Michael Sisk mjsisk@ufl.edu
Created: 5/11/2018 3:23:46 PM
Form version: 1

Responses

Recommended Prefix SWS
Course Level 5
Number XXX
Category of Instruction Introductory
Lab Code None
Course Title Aquatic Toxicology: Science and Applications
Transcript Title Aquatic Toxicology
Degree Type Graduate

Delivery Method(s) On-Campus
Co-Listing Yes
Co-Listing Explanation Students taking this course for graduate credit will be required to complete a special project for credit. Students will write a comprehensive term paper focused on a particular contaminant (or class of contaminants), its fate in the aquatic environment, and effects on aquatic biota (including modes of action, etc.). Graduate students will also be required to present their results in a 30minute lecture to the class.

Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description Introduces foundational knowledge and concepts of the field of aquatic toxicology. Examines how environmental and chemical properties influence the fate and bioavailability of contaminants in aquatic environments; introduces principles of toxicology and methods used to study aquatic toxicology, as well as applications of knowledge gained from aquatic toxicology studies.
Prerequisites BSC 2005 & BSC 2005L or BSC 2010 & BSC 2010L
CHM 2045 & CHM 2045L
CHM 2046 & CHM 2046L

Co-requisites None
Rationale and Placement in Curriculum This course broadly covers fundamentals of how environmental factors and chemical properties
influence the fate and bioavailability of contaminants in the aquatic environment. It addresses principles of toxicology, methods used in the study of aquatic toxicology, and applications of knowledge gained from aquatic toxicology studies. The topic of aquatic toxicology is definitely pertinent to environmental applications of soil and water sciences. This course fills a gap in ourcurriculum, especially for students in the Water Science track.
Course Objectives Students will develop foundational knowledge needed to understand this multi-disciplinary field. After completing this course, students will be able to:

- identify and qualitatively describe how the unique, dynamic properties of chemicals and the environment influence the fate and bioavailability of contaminants in the aquatic environment.
- explain when and why some contaminants are toxic while others are not.

- identify and design toxicity tests based on data needs
- synthesize information from previous objectives and apply it for evaluating risks to aquatic organisms.

Course Textbook(s) and/or Other Assigned Reading REQUIRED BOOK: An Introduction to Aquatic Toxicology (Mikko Nikinmaa, 2014) ISBN 978-0-12-411574-3.

RECOMMENDED BOOKS: Additional texts that may be useful include: Fundamentals of Aquatic Toxicology (Gary Rand ed., 1995) and Fundamentals of Ecotoxicology (Michael Newman 2015 or earlier). Additional handouts and references to specific topics may be given during the semester.

Weekly Schedule of Topics LECTURE SCHEDULE:

Week	Lecture	Topic	Quiz
Introductory materials			
1	1	Course introduction/Historical perspectives	
	2	Historical Perspectives	
	3	Brief introduction to aquatic toxicology	x
Factors affecting exposures			
2	4	Chemical factors affecting exposures	
	5	Chemical factors affecting exposures	
	6	Environmental (aquatic) factors affecting exposures	x
3	7	Exam 1	
Contaminants and toxicants			
	8	Toxic agents and contaminants	
	9	Toxic agents and contaminants	
Principles of toxicology			
4	10	Bioavailability	
	11	Bioavailability	
	12	Basic toxicological concepts and principles	x
5	13	Basic toxicological concepts and principles	
Uptake and elimination of contaminants			
	14	Uptake of Contaminants	
	15	Elimination of contaminants/bioaccumulation/bioconcentration	x
		Phase I metabolism	
6	16	Overview of Molecular aspects, activation-detoxification, and biomarkers	
	17	Phase I biotransformations-CYP450's	
	18	CYP450 regulation and inducibility	x
7	19	Other Phase I biotransformations	
	20	Exam 2	
	21	Phase II biotransformations	
8	22	Sequestration	x
Toxicity: modes-of-action			
	23	Oxidative stress and antioxidant response	
	24	Enzyme dysfunction and substrate pool shifts	
9	25	Stress proteins	x
	26	DNA modification	
	27	Effects on cells, tissues, and organs	
10	28	Exam 3	
	29	Contaminant-induced sublethal effects	
Methods used in aquatic toxicology			
	30	Organisms for aquatic toxicity testing	
11	31	Organisms for aquatic toxicity testing	
	32	Toxicity testing-introduction, test design, exposure systems	x
	33	Toxicity testing-introduction, test design, exposure systems	
12	34	Toxicity testing-introduction, test design, exposure systems	
	35	Factors affecting quantitative responses/sediment	x
	36	Quantitative estimators of effects	
13	37	Exam 4	
	38	Effects on populations	
	39	Effects on communities and ecosystems	
Applications of toxicity data for ecological risk assessment			

14	40	Ecological risk assessment	x
	41	Ecological risk assessment	
	42	*Graduate student presentations/Case studies	
15	43	Review for final exam	

Links and Policies Grades and Grade Points
For information on current UF policies for assigning grade points, see
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx
Attendance and Make-Up Work
Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.
Online Course Evaluation Process
Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."
It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.
Software Use:
All faculty, staff and students of the university are required and expected to obey the 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.
Services for Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation
0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/
Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.
• University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu
Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library

Wellness Coaching
• U Matter We Care, www.umatter.ufl.edu/
• Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/next-level
Student Complaints:
• Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
Grading
Grading Scheme Graduate students

Evaluation endpoint	Frequency	% of total grade
Participation	Weekly	5
Quizzes and assignments	As announced	10
Exams 4	50	
Final exam	1	20
Special project	1	15 (7.5% paper/7.5% lecture)

Grading Scale

A	93% and above	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	E	Below 60

Instructor(s) P. Chris Wilson
Office: 3167 McCarty Hall A
Office phone: 352-294-3166
Email: pcwilson@ufl.edu

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Institute of Food and Agricultural Sciences
Soil and Water Sciences Department

2181 McCarty Hall
PO Box 110290
University of Florida
Gainesville, FL 32611
Telephone: 352-294-3110
Fax: 352-392-3902
apatite@ufl.edu

September 29, 2017

Dear CALS Curriculum Committee:

We are requesting that the course titled "Aquatic Toxicology: Science and Applications", currently awaiting assignment of a unique course number, be approved as a 4XXX/5XXX co-taught course. This course broadly covers fundamentals of how environmental factors and chemical properties influence the fate and bioavailability of contaminants in the aquatic environment. It addresses principles of toxicology, methods used in the study of aquatic toxicology, and applications of knowledge gained from aquatic toxicology studies. The topic of aquatic toxicology is definitely pertinent to environmental applications of soil and water sciences. This course fills a gap in our curriculum, especially for students in the Water Science track. We are not aware of another course offered at the University of Florida that would deliver the targeted training and perspective provided by this proposed course.

Graduate students will be required to write a comprehensive term paper focused on a particular contaminant (or class of contaminants), its fate in the aquatic environment, and effects on aquatic biota. In addition, they will present their results in a 30-minute lecture to the class. This paper will constitute 15% of the final grade.

Please let us know if you have questions.

Thanks.

Dr. James Bonczek
Undergraduate Coordinator, Senior Lecturer, Soil and Water Sciences Department

Willie Harris

Dr. Willie Harris
Graduate Coordinator, Professor, Soil and Water Sciences Department

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Environmental Engineering Sciences	Professor and Department Head
Phone Number	**E-mail**
352-392-0845	cywu@ufl.edu

Comments

Department of Environmental and Global Health in College of Public Health and Center for Environmental and Human Toxicology in College of Veterinary Medicine offer courses in this subject area.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Environmental and Global Health	Joseph Bisesi, Assistant Professor
Phone Number	**E-mail**
(352) 294-4703	jbisesi@phhp.ufl.edu

Comments

We have reviewed the syllabus for the proposed aquatic toxicology course and found that while there is a areas which may overlap with content in PHC6937: Environmental Toxicology Concepts in Public Health and PHC6301: Aquatic Systems and Environmental Health, neither of these courses are specifically focused on aquatic toxicology and we feel there is a need for a course such as the one that was proposed here. We do not have any objections to the approval of this course.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

Aquatic Toxicology: Science and Applications
SWS 5XXX

3 credit hours – Spring Semesters

Instructor: P. Chris Wilson
Office: 3167 McCarty Hall A
Office phone: 352-294-3166
Email: pcwilson@ufl.edu

Office hours: Open door policy (If not regularly on my hallway, email for availability before coming or for appointment)

Course location: McCarty Hall B, Room 3124
meeting times: MWF 11:45 am

CATALOG DESCRIPTION: Introduces foundational knowledge and concepts of the field of aquatic toxicology. Examines how environmental and chemical properties influence the fate and bioavailability of contaminants in aquatic environments; introduces principles of toxicology and methods used to study aquatic toxicology, as well as applications of knowledge gained from aquatic toxicology studies.

COURSE OBJECTIVES: Students will develop foundational knowledge needed to understand this multi-disciplinary field. After completing this course, students will be able to:

- identify and qualitatively describe how the unique, dynamic properties of chemicals and the environment influence the fate and bioavailability of contaminants in the aquatic environment.
- explain when and why some contaminants are toxic while others are not.
- identify and design toxicity tests based on data needs
- synthesize information from previous objectives and apply it for evaluating risks to aquatic organisms.

DELIVERY METHOD: Hybrid course. Online lectures with weekly face-to-face meetings during 1 class period each week. Online lectures (powerpoint presentations) and other course materials delivered through the Canvas E-Learning System.

PRE-REQUISITES/CO-REQUISITES:
BSC 2005 & BSC 2005L or BSC 2010 & BSC 2010L
CHM 2045 & CHM 2045L
CHM 2046 & CHM 2046L
Or with consent from instructor

LECTURE SCHEDULE:

Week	Lecture	Topic	Quiz
		Introductory materials	
1	1	Course introduction/Historical perspectives	
	2	Historical Perspectives	
	3	Brief introduction to aquatic toxicology	x
		Factors affecting exposures	
2	4	Chemical factors affecting exposures	

	5	Chemical factors affecting exposures	
	6	Environmental (aquatic) factors affecting exposures	x
3	7	Exam 1	
		Contaminants and toxicants	
	8	Toxic agents and contaminants	
	9	Toxic agents and contaminants	
		Principles of toxicology	
4	10	Bioavailability	
	11	Bioavailability	
	12	Basic toxicological concepts and principles	x
5	13	Basic toxicological concepts and principles	
		Uptake and elimination of contaminants	
	14	Uptake of Contaminants	
	15	Elimination of contaminants/bioaccumulation/bioconcentration	x
		Phase I metabolism	
6	16	Overview of Molecular aspects, activation-detoxification, and biomarkers	
	17	Phase I biotransformations-CYP450's	
	18	CYP450 regulation and inducibility	x
7	19	Other Phase I biotransformations	
	20	Exam 2	
	21	Phase II biotransformations	
8	22	Sequestration	x
		Toxicity: modes-of-action	
	23	Oxidative stress and antioxidant response	
	24	Enzyme dysfunction and substrate pool shifts	
9	25	Stress proteins	x
	26	DNA modification	
	27	Effects on cells, tissues, and organs	
10	28	Exam 3	
	29	Contaminant-induced sublethal effects	
		Methods used in aquatic toxicology	
	30	Organisms for aquatic toxicity testing	
11	31	Organisms for aquatic toxicity testing	
	32	Toxicity testing-introduction, test design, exposure systems	x
	33	Toxicity testing-introduction, test design, exposure systems	
12	34	Toxicity testing-introduction, test design, exposure systems	
	35	Factors affecting quantitative responses/sediment	x
	36	Quantitative estimators of effects	
13	37	Exam 4	
	38	Effects on populations	
	39	Effects on communities and ecosystems	

Applications of toxicity data for ecological risk assessment			
14	40	Ecological risk assessment	x
	41	Ecological risk assessment	
	42	*Graduate student presentations/Case studies	
15	43	Review for final exam	

GRADUATE CREDIT: Students taking this course for graduate credit will be required to complete a special project for credit. Students will write a comprehensive term paper focused on a particular contaminant (or class of contaminants), its fate in the aquatic environment, and effects on aquatic biota (including modes of action, etc.). Graduate students will also be required to present their results in a 30 minute lecture to the class.

STUDENT ASSESSMENT:

1. You are expected to attend and be prepared to participate in all class sessions. A portion of the grade is based on meaningful class participation, demonstrated student interest, and overall student dedication.

2. Assessments are based on exams, quizzes, and participation in class.

3. Course grades will be determined as follows (%):

Graduate students

Evaluation endpoint	Frequency	% of total grade
Participation	Weekly	5
Quizzes and assignments	As announced	10
Exams	4	50
Final exam	1	20
Special project	1	15 (7.5% paper/7.5% lecture)

Grading Scale

A	93% and above	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	E	Below 60

Current UF grading policies for assigning grade points may be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

ATTENDANCE AND CONDUCT: Students should be ready to begin class as soon as the scheduled start time is reached (i.e. arrive early). Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx. Cell phones should be silenced during class.

COMMUNICATION. Students are encourage to always ask questions during class regarding subject material, assignments, etc. that they do not understand so that others may also benefit. Questions and

discussions about personal issues (e.g. grades, make-up work, etc.) should take place one-on-one before/after class, during office hours, or by email.

REQUIRED BOOK: *An Introduction to Aquatic Toxicology* (Mikko Nikinmaa, 2014) ISBN 978-0-12-411574-3.

RECOMMENDED BOOKS: Additional texts that may be useful include: *Fundamentals of Aquatic Toxicology* (Gary Rand ed., 1995) and *Fundamentals of Ecotoxicology* (Michael Newman 2015 or earlier). Additional handouts and references to specific topics may be given during the semester.

COURSE FEEDBACK AND EVALUATION: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: If you require classroom accommodation because of a disability, you must first register with the Disability Resource Center (352-392-8565; www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, you will receive an accommodation letter that must be presented to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework. Students needing accommodations should request them as early as possible in the semester.

ACADEMIC HONESTY: UF students are bound by The Honor Pledge, which states, " We, the members of the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty 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 (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) 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 in this class.

SOFTWARE USE: All faculty, staff and students of the University are required and expected to obey the 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.

CAMPUS RESOURCES

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek assistance from appropriate University resources.

Health and Wellness

U Matter, We Care

If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center
http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 911 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

The Student Health Care Center
Primary and specialty health care. http://shcc.ufl.edu/.

Alachua County Crisis Center
Crisis intervention is always available 24/7: (352) 264-6789.

Academic Resources

E-learning technical support
352-392-4357 (select option 2) or email to Learning-support@ufl.edu.
http://lss.at.ufl.edu/help.shtml.

Career Resource Center
Reitz union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu.

Library Support
http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center
Broward Hall, 392-2010 or 392-6420. General skills and tutoring. http://teachingcenter.ufl.edu.

Writing Studio
302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
http://writing.ufl.edu/writing-studio/.

Student Complaints
Campus: https://www.dso.ufl.edu/documents/UF_Complaints_Policy.pdf.
On-Line Students: http://www.distance.ufl.edu/student-complaint-process.

Cover Sheet: Request 12781

AEC6933 Seminar in Agricultural Education & Communication

Info

Process	Course|Modify|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rebecca Trammell rtrammell@ufl.edu
Created	6/19/2018 11:17:27 AM
Updated	6/19/2018 11:50:15 AM
Description of request	Change from 1-3 credits to 0-3 credits.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Agricultural Education and Communication 514926000	Brian Myers		6/19/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			6/19/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|Modify for request 12781

Info

Request: AEC6933 Seminar in Agricultural Education & Communication
Description of request: Change from 1-3 credits to 0-3 credits.
Submitter: Rebecca Trammell rtrammell@ufl.edu
Created: 6/19/2018 11:08:22 AM
Form version: 1

Responses

Current Prefix AEC
Course Level 6
Number 933
Lab Code None
Course Title Seminar in Agricultural Education & Communication
Effective Term Earliest Available
Effective Year Earliest Available
Requested Action Other (selecting this option opens additional form fields below)
Change Course Prefix? No

Change Course Level? No

Change Course Number? No

Change Lab Code? No

Change Course Title? No

Change Transcript Title? No

Change Credit Hours? Yes
Current Credit Hours Variable
Proposed Credit Hours Variable
Change Variable Credit? Yes
Current Min and Max Credits 1-3
Proposed Min and Max Credits 0-3
Change S/U Only? No

Change Contact Type? No

Change Rotating Topic Designation? No

Change Repeatable Credit? No

Maximum Repeatable Credits 6
Change Course Description? No

Change Prerequisites? No

Change Co-requisites? No

Rationale We would like to use this course as a seminar for incoming graduate students to provide more structured advising in their first semester. Students will need to take this course for zero credit hours as not to interfere with their program of study and assistantship funding.

Cover Sheet: Request 12511

WIS6934 Topics in Wildlife and Range Sciences

Info

Process	Course|Modify|Grad
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Claire Williams ccwillia@ufl.edu
Created	4/9/2018 3:44:44 PM
Updated	4/10/2018 8:57:57 AM
Description of request	Advanced concepts and practices in wildlife management and conservation. Topics vary.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Wildlife Ecology and Conservation 514947000	Eric Hellgren		4/10/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			4/10/2018
No document changes					
Graduate Curriculum Committee					
No document changes					
University Curriculum Committee Notified					
No document changes					
Statewide Course Numbering System					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
College Notified					
No document changes					

Course|Modify for request 12511

Info

Request: WIS6934 Topics in Wildlife and Range Sciences
Description of request:
Advanced concepts and practices in wildlife management and conservation. Topics vary.

Submitter: Claire Williams ccwillia@ufl.edu
Created: 4/9/2018 3:31:21 PM
Form version: 1

Responses

Current Prefix WIS
Course Level 6
Number 934
Lab Code None
Course Title Topics in Wildlife and Range Sciences
Effective Term Earliest Available
Effective Year Earliest Available
Requested Action Other (selecting this option opens additional form fields below)
Change Course Prefix? No

Change Course Level? No

Change Course Number? No

Change Lab Code? No

Change Course Title? No

Change Transcript Title? No

Change Credit Hours? No

Change Variable Credit? No

Change S/U Only? No

Change Contact Type? No

Change Rotating Topic Designation? No

Change Repeatable Credit? No

Maximum Repeatable Credits 10
Change Course Description? No

Change Prerequisites? Yes
Current Prerequisites Prereq: WIS 6452, WIS 5555C, or consent of instructor
Proposed Prerequisites Prereq: None
Change Co-requisites? No

Rationale Course-specific prerequisites are not required for the majority of special topics taught.

Cover Sheet: Request 12772

ENT4XXX Ecology and Conservation of Pollinators

Info

Process	Course|New|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Rachel Mallinger rachel.mallinger@ufl.edu
Created	6/13/2018 1:28:50 PM
Updated	7/18/2018 4:18:46 PM
Description of request	This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Entomology and Nematology 514914000	Heather Mcauslane		7/2/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			7/2/2018
No document changes					
University Curriculum Committee					
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 12772

Info

Request: 4XXX Ecology and Conservation of Pollinators
Description of request: This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.
Submitter: Rachel Mallinger rachel.mallinger@ufl.edu
Created: 7/18/2018 4:18:23 PM
Form version: 4

Responses

Recommended Prefix ENY
Course Level 4
Number XXX
Category of Instruction Joint (Ugrad/Grad)
Lab Code None
Course Title Ecology and Conservation of Pollinators
Transcript Title Eco Cons Pollinator
Degree Type Baccalaureate

Delivery Method(s) On-Campus
Co-Listing Yes
Co-Listing Explanation This course is a joint undergraduate and graduate level course; both graduate and undergraduate students will attend the same on-campus class periods. Graduate students will be expected to do an additional assignment (lead a class discussion on two scientific publications), a more rigorous assignment (longer and more in-depth research paper of 7-8 pages with 10 citations in comparison to 4-5 pages with 3 citations for undergraduate student papers), and additional readings (for research paper and leading discussion).
Effective Term Spring
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.
Prerequisites (BSC 2010(C-) or equivalent) & (BSC 2010 L(C-) or equivalent) & (junior or senior standing)
Co-requisites None
Rationale and Placement in Curriculum Currently, there are no undergraduate courses at UF on pollination ecology and pollinator conservation. These topics have recently received much attention due to concerns over pollinator population declines, honey bee colony losses, and inadequate crop pollination. This course will address this need by focusing on both the ecology of animal pollinators and the plants that they pollinate, as well as current threats to pollinators and conservation plans. Furthermore, this course will include an inquiry-based field research project, reading and discussing the primary literature, and scientific writing to build critical-thinking and communication skills in undergraduate students. This course will be offered as an elective within the Entomology & Nematology Department's curriculum.
Course Objectives 1. Describe the role of pollinators in both natural and agricultural systems, and the breadth of animal pollinator taxa
2. Explain basic concepts of pollination ecology and relate these concepts to observable phenomena in nature

3. Diagnose factors affecting pollinator populations today, and assess the consequences of pollinator declines for biodiversity and global food production.
4. Analyze, interpret and critique scientific literature
5. Develop and carry out a field-based research project
6. Communicate research in the form of a scientific paper and oral presentation

Course Textbook(s) and/or Other Assigned Reading No textbook is purchased for this course. Readings for the course will be provided to students via the course website.

The following readings will be assigned for discussion, and a few additional readings will be selected by graduate students:

Aguilar-Rodríguez, P.A., G, M., Cristina, M., Krömer, T., García-Franco, J.G., Knauer, A., Kessler, M., 2014. First record of bat-pollination in the species-rich genus Tillandsia (Bromeliaceae). Ann Bot 113, 1047–1055. https://doi.org/10.1093/aob/mcu031

Cakmak, I., Sanderson, C., Blocker, T.D., Pham, L.L., Checotah, S., Norman, A.A., Harader-Pate, B.K., Reidenbaugh, R.T., Nenchev, P., Barthell, J.F., Wells, H., 2009. Different solutions by bees to a foraging problem. Anim. Behav. 77, 1273–1280. https://doi.org/10.1016/j.anbehav.2009.01.032

Camazine, S. 1993. The regulation of pollen foraging by honey bees: How foragers assess the colony's need for pollen. Behav Ecol Sociobiol 32: 265 – 272.

Goering, D. 2016. North Dakota Pollinator Plan. North Dakota Department of Agriculture. Bismarck, North Dakota.

Fenster, C.B., Reynolds, R.J., Williams, C.W., Makowsky, R., Dudash, M.R. 2015. Quantifying hummingbird preference for floral trait combinations: The role of selection on trait interactions in the evolution of pollination syndromes. Evolution 69, 1113–1127. https://doi.org/10.1111/evo.12639

Herbertsson, L., Lindström, S.A.M., Rundlöf, M., Bommarco, R., Smith, H.G. 2016. Competition between managed honeybees and wild bumblebees depends on landscape context. Basic and Applied Ecology. https://doi.org/10.1016/j.baae.2016.05.001

Kearns, C.A., Inouye, D.W., 1993. Techniques for pollination biologists. University Press of Colorado.

Klein, A.M., Vaissiere, B.E., Cane, J.H., Steffan-Dewenter, I., Cunningham, S.A., Kremen, C., Tscharntke, T., 2007. Importance of pollinators in changing landscapes for world crops. Proceedings of the Royal Society B-Biological Sciences 274, 303–313.

Knauer, A.C., Schiestl, F.P., 2015. Bees use honest floral signals as indicators of reward when visiting flowers. Ecology Letters 18, 135–143. https://doi.org/10.1111/ele.12386

Krauss, J., Steffan-Dewenter, I., Tscharntke, T. 2003. How does landscape context contribute to effects of habitat fragmentation on diversity and population density of butterflies? Journal of Biogeography 30, 889–900. https://doi.org/10.1046/j.1365-2699.2003.00878.x

Kremen, C., M'Gonigle, L.K., 2015. EDITOR'S CHOICE: Small-scale restoration in intensive agricultural landscapes supports more specialized and less mobile pollinator species. J Appl Ecol 52, 602–610. https://doi.org/10.1111/1365-2664.12418

Kudo, G., Ida, T.Y., 2013. Early onset of spring increases the phenological mismatch between plants and pollinators. Ecology 94, 2311–2320. https://doi.org/10.1890/12-2003.1

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Memmott, J., 1999. The structure of a plant-pollinator food web. Ecology Letters 2, 276–280. https://doi.org/10.1046/j.1461-0248.1999.00087.x

Rader, R., Bartomeus, I., Garibaldi, L.A., Garratt, M.P.D., Howlett, B.G., Winfree, R., Cunningham, S.A., Mayfield, M.M., Arthur, A.D., Andersson, G.K.S., Bommarco, R., Brittain, C., Carvalheiro, L.G.,

Chacoff, N.P., Entling, M.H., Foully, B., Freitas, B.M., Gemmill-Herren, B., Ghazoul, J., Griffin, S.R., Gross, C.L., Herbertsson, L., Herzog, F., Hipólito, J., Jaggar, S., Jauker, F., Klein, A.-M., Kleijn, D., Krishnan, S., Lemos, C.Q., Lindström, S.A.M., Mandelik, Y., Monteiro, V.M., Nelson, W., Nilsson, L., Pattemore, D.E., de O. Pereira, N., Pisanty, G., Potts, S.G., Reemer, M., Rundlöf, M., Sheffield, C.S., Scheper, J., Schüepp, C., Smith, H.G., Stanley, D.A., Stout, J.C., Szentgyörgyi, H., Taki, H., Vergara, C.H., Viana, B.F., Woyciechowski, M., 2015. Non-bee insects are important contributors to global crop pollination. Proceedings of the National Academy of Sciences 201517092. https://doi.org/10.1073/pnas.1517092112

Rundlöf, M., Andersson, G.K.S., Bommarco, R., Fries, I., Hederström, V., Herbertsson, L., Jonsson, O., Klatt, B.K., Pedersen, T.R., Yourstone, J., Smith, H.G., 2015. Seed coating with a neonicotinoid insecticide negatively affects wild bees. Nature 521, 77–80. https://doi.org/10.1038/nature14420

Sakata, Y., Nakahama, N. 2018. Flexible pollination system in an unpalatable shrub Daphne miyabeana (Thymelaeaceae). Plant Species Biology https://doi.org/10.1111/1442-1984.12212

Singh, R., Levitt, A.L., Rajotte, E.G., Holmes, E.C., Ostiguy, N., vanEngelsdorp, D., Lipkin, W.I., dePamphilis, C.W., Toth, A.L., Cox-Foster, D.L., 2010. RNA Viruses in Hymenopteran Pollinators: Evidence of Inter-Taxa Virus Transmission via Pollen and Potential Impact on Non-Apis Hymenopteran Species. PLoS ONE 5, e14357. https://doi.org/10.1371/journal.pone.0014357

Steffan-Dewenter, I., Munzenberg, U., Burger, C., Thies, C., Tscharntke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. Ecology 83, 1421–1432.

Wilson, J.S., Carril, O.J.M., 2015. The Bees in Your Backyard: A Guide to North America's Bees. Princeton University Press, Princeton.

Winfree, R., Aguilar, R., Vázquez, D.P., LeBuhn, G., Aizen, M.A., 2009. A meta-analysis of bees' responses to anthropogenic disturbance. Ecology 90, 2068–2076. https://doi.org/10.1890/08-1245.1

Weekly Schedule of Topics Week 1: Plants: plant reproduction
Week 2: Pollinators: Bees, other insects, other animals
Week 3: Pollinator behavior: foraging theory, learning
Week 4: Plant-pollinator interactions: Co-evolution, pollination syndromes, networks
Week 5: Plant-pollinator interactions continued, crop pollination requirements
Week 6: Research methods and midterm
Week 7: Introduction to pollinator declines and conservation, student presentations
Week 8: Student Presentations
Week 9: Spring break
Week 10: Pollinator stressors: land-use change and pesticides
Week 11: Pollinator stressors: diseases **visit sites for research projects
Week 12: Pollinator stressors: climate change, invasive species, managed bees ** data collection and organizing
Week 13: data collection outside in groups
Week 14: Pollinator conservation: conservation plans **analyzing plant-pollinator data: statistics, graphs, and tables
Week 15: Pollinator conservation: habitat restoration, pollinator plantings, integrated crop pollination ** paper peer-review in pairs
Week 16: Papers due, flexible time, reading day
Finals week: Course wrap-up

Links and Policies Attendance and Make-Up Work
Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Online Course Evaluation Process
Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open.

Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Academic Honesty
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software Use:
All faculty, staff and students of the university are required and expected to obey the 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.

Services for Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
- Counseling Services
- Groups and Workshops
- Outreach and Consultation
- Self-Help Library
- Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Grading Scheme Grades and assignments:

Participation: 50 pts, 10%
Quizzes (8): 80 pts, 16%
Research project paper: 120 pts, 24%
Paper peer-review: 25 pts, 5%

Presentation on pollinator or plant: 100 pts, 20%
Midterm: 125 pts, 25%

Quizzes: There will be 10 unannounced quizzes throughout the semester that will cover the assigned readings for each day, and will take place at the beginning of class prior to discussion or lecture. Your lowest 2 quizzes for the semester will be dropped, and your grade for this component will be based on the best 8 of 10 quizzes.

Presentation: Each student will present on a selected pollinator or plant. Presentations should be approximately 10 minutes long and cover the general biology, ecology, and geography of the pollinator or plant, as well as the conservation status or threats to current populations of the pollinator/plant.

Research project paper: In groups of 4, you will be generating a research question and carrying out a field lab related to some aspect of pollination biology or pollinator ecology. We will learn about research methods and visit sites near Steinmetz Hall for data collection, followed by time in class to work as groups and collect data. Students may have to collect additional data outside of class time. While projects will be conducted in groups of 4, students must write up individual papers in the format of a scientific manuscript including an introduction, methods, results, and discussion. Paper drafts will be peer-reviewed in student pairs 1 week prior to the due date, and your review of a classmate's paper will account for 25 points of your total course grade. Undergraduate student papers should be 4-5 pages in length, excluding any tables, figures, or references list, with a minimum of 3 scientific references Additional criteria and writing tips will be distributed in class.

Grade distribution:

A	94.0 - 100
A-	90.0 – 93.99
B+	86.0 – 89.99
B	83.0 – 85.99
B-	80.0 – 82.99
C+	76.0 – 79.99
C	73.0 – 75.99
C-	70.0 – 72.99
D+	66.0 – 69.99
D	63.0 – 65.99
D-	60.0 – 62.99
E	59.99 and below

Instructor(s) Rachel Mallinger

4XXX/6XXX: Ecology and Conservation of Pollinators, 3 credits

Meeting day and time: TBD

Instructor: Dr. Rachel Mallinger

2110 Steinmetz Hall

rachel.mallinger@ufl.edu

352-273-3962

Office Hours: TBD, 2110 Steinmetz Hall

Course Description: This course will examine interactions between animals and the plants that they pollinate, current threats to pollinator populations, and the conservation of pollinators worldwide. In this course, we will explore these topics through readings, discussion, and a field research project.

Course Background: Welcome to Ecology and Conservation of Pollinators! Pollinators are keystone species in both natural and agricultural habitats, responsible for the reproduction of an estimated 87.5% of flowering plants including many crops. In recent years, documented declines in some pollinator species have heightened awareness of pollinator conservation. In the first half of this course, we will explore the fascinating world of pollination ecology, including plant-pollinator interactions, co-evolution, and pollinator foraging behaviors In the second half of the class, we will discuss the conservation status of pollinators, including stressors such as climate change, land-use change, pesticides, and pathogens. Students will conduct an inquiry-based field research project on pollinator ecology, and will additionally present to the class on a selected pollinator or plant.

Prerequisites: BSC 2010 and 2010 L, with a grade of C- or higher, or equivalent, and junior or senior standing, or instructor permission.

College-level general biology is required; a course in botany (e.g. BOT 2010C), ecology (e.g. PCB 4043C) or entomology (ENY 3005) is encouraged but not required.

Learning Objectives: By the end of the class, students will be able to:

1. Describe the role of pollinators in both natural and agricultural systems, and the breadth of animal pollinator taxa.
2. Explain basic concepts of pollination ecology and relate these concepts to observable phenomena in nature.
3. Diagnose factors affecting pollinator populations today, and assess the consequences of pollinator declines for biodiversity and global food production.
4. Analyze, interpret and critique scientific literature.
5. Develop and carry out a field-based research project.
6. Communicate research in the form of a scientific paper and oral presentation.

Required materials: No textbook is required for this course. Readings for the course will be provided to students via the course website in Canvas.

Grades and assignments:
This course is a joint undergraduate and graduate level course; both graduate and undergraduate students will attend the same on-campus class periods. Graduate students will be expected to do an additional assignment (lead discussion), a more rigorous assignment (longer and more in-depth research paper), and additional readings (for research paper and discussion) as further outlined below.

	Undergraduate (500 points total)	Graduate (550 points total)
participation	50 pts	50 pts
quizzes (8)	80 pts	80 pts
leading discussion	NA	50 pts
research project paper	120 pts	120 pts
paper peer-review	25 pts	25 pts
presentation on pollinator/plant conservation	100 pts	100 pts
midterm exam	125 pts	125 pts

Quizzes: There will be 10 unannounced quizzes throughout the semester that will cover the assigned readings for each day, and will take place at the beginning of class prior to discussion or lecture. Your lowest 2 quizzes for the semester will be dropped, and your grade for this component will be based on the best 8 of 10 quizzes.

***Leading discussion*:** Graduate students will lead discussion on scientific papers assigned throughout the semester. Graduate students will be responsible for **selecting a second reading** to complement the assigned reading listed in the syllabus. Selected papers must be emailed to me at least 1 week prior to the scheduled discussion for approval and dissemination to the rest of the class. On the day of discussion, graduate students leading the discussion will turn in a list of discussion questions that they have prepared for class.

Presentation: Each student will present on a selected pollinator or plant. Presentations should be approximately 10 minutes long and cover the general biology, ecology, and geography of the pollinator or plant, as well as the conservation status or threats to current populations of the pollinator/plant.

Research project paper: In groups of four, you will be generating a research question and carrying out a field lab related to some aspect of pollination biology or pollinator ecology. We will learn about research methods and visit sites near Steinmetz Hall for data collection, followed by time in class to work as groups and collect data. Students may have to collect additional data outside of class time. While projects will be conducted in groups of four, students must write up **individual papers** in the format of a scientific manuscript including an introduction, methods, results, and discussion. Paper drafts will be peer-reviewed in student pairs prior to the due date, and your review of a classmate's paper will account for 25 points of your total course grade. Undergraduate student papers should be 4-5 pages in length, excluding any tables, figures, or references list, with a minimum of 3 scientific references, while graduate student papers should

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C-	70.0 – 72.99
D+	66.0 – 69.99
D	63.0 – 65.99
D-	60.0 – 62.99
E	59.99 and below

Grades and Grade Points

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Course schedule and due dates:

Week	Date	Topic	Reading	Assignments due and important notes
1	Jan 8 - T	Course introduction		
1	Jan 10 - Th	Plants: reproduction and pollination	Sakata and Nakahama 2018	discussion (instructor-led)
2	Jan 15 - T	Pollinators: Bees	Sections from Wilson and Carril 2015	
2	Jan 17 - Th	Pollinators: Other insects and non-insect animals	Rader et al. 2015; Aguilar-Rodriguez et al. 2015	discussion
3	Jan 22 - T	Pollinator behavior: foraging theory	Cakmak et al. 2009	
3	Jan 24 - Th	Pollinator behavior: floral cues and learning	Knauer and Schiestl 2015	discussion
4	Jan 29 – T	Pollinator behavior: social insects and behavior at colony level	Camazine 1993	
4	Jan 31 – Th	Plant-pollinator interactions: Coevolution and pollination syndromes	Fenster et al. 2015	discussion
5	Feb 5 – T	Plant-pollinator interactions: networks, specialization, flexible foraging	Memmott 1999	
5	Feb 7 – Th	Crop pollination: pollinator-dependent crops and managed pollinators	Klein et al. 2007	discussion

6	Feb 12 – T	Research methods: plants and pollinators.	selected sections from Kearns and Inouye 1993	
6	Feb 14 – Th	Midterm		**Midterm**
7	Feb 19 – T	Introduction to pollinator declines and conservation	Winfree et al. 2009	discussion
7	Feb 21 – Th	Presentations		
8	Feb 26 – T	Presentations		
8	Feb 28 – Th	Presentations		
9	Spring break			
10	March 12 – T	Pollinator stressors: land-use change	Steffan-Dewenter et al. 2002; Krauss et al. 2003	discussion
10	March 14 – Th	Pollinator stressors: pesticides **Research group formation	Rundlof et al. 2015	discussion, time in groups for research planning
11	March 19 – T	Pollinator stressors: pathogens	Singh et al. 2010	discussion
11	March 21 – Th	visit sites around campus for research project		outside
12	March 26 – T	lecture on data collection and organization **time for project planning in groups		**Research project outline due at end of class**
12	March 28 – Th	Pollinator stressors: climate change, invasive species, managed bees	Kudo and Ida 2013, Herbertsson et al. 2016	discussion
13	April 2 – T	data collection in groups		outside
13	April 4 – Th	data collection in groups		outside
14	April 9 – T	Pollinator conservation: conservation plans (back-up data collection day)	excerpts from Wisconsin and North Dakota Pollinator Protection Plans	
14	April 11 – Th	Analyzing plant-pollinator data: statistics, tables, and graphs ** time for working in groups on analyzing data		
15	April 16 – T	Pollinator conservation: habitat restoration, pollinator plantings	Kremen and M'Gonigle 2015	discussion **paper rough drafts due for peer-review**
15	April 18 – Th	Pollinator conservation: integrated crop pollination ** paper peer-review in student pairs		**peer review forms due at end of class**
16	April 23 - T	Flex day		**Research papers due**
16	April 25 - Th	Reading day		
finals week		Course wrap-up		

Full reading list

Aguilar-Rodríguez, P.A., G, M., Cristina, M., Krömer, T., García-Franco, J.G., Knauer, A., Kessler, M., 2014. First record of bat-pollination in the species-rich genus Tillandsia (Bromeliaceae). Ann Bot 113, 1047–1055. https://doi.org/10.1093/aob/mcu031

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Singh, R., Levitt, A.L., Rajotte, E.G., Holmes, E.C., Ostiguy, N., vanEngelsdorp, D., Lipkin, W.I., dePamphilis, C.W., Toth, A.L., Cox-Foster, D.L., 2010. RNA Viruses in Hymenopteran Pollinators: Evidence of Inter-Taxa Virus Transmission via Pollen and Potential Impact on Non-Apis Hymenopteran Species. PLoS ONE 5, e14357. https://doi.org/10.1371/journal.pone.0014357

Steffan-Dewenter, I., Munzenberg, U., Burger, C., Thies, C., Tscharntke, T., 2002. Scale-dependent effects of landscape context on three pollinator guilds. Ecology 83, 1421–1432.

Wilson, J.S., Carril, O.J.M., 2015. The Bees in Your Backyard: A Guide to North America's Bees. Princeton University Press, Princeton.

Winfree, R., Aguilar, R., Vázquez, D.P., LeBuhn, G., Aizen, M.A., 2009. A meta-analysis of bees' responses to anthropogenic disturbance. Ecology 90, 2068–2076. https://doi.org/10.1890/08-1245.1

Attendance and Make-Up Work

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

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*" You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers,

quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

Services for Students with Disabilities

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0001 Reid Hall, 352-392-8565, **www.dso.ufl.edu/drc/**

Campus Helping Resources

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- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* **www.counseling.ufl.edu/cwc/**

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Wellness Coaching

- U Matter We Care, **www.umatter.ufl.edu/**
- *Career Resource Center,* First Floor JWRU, 392-1601, **www.crc.ufl.edu/**

Student Complaints

Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
Online Course: http://www.distance.ufl.edu/student-complaint-process

Cover Sheet: Request 12849

FYC4XXX

Info

Process	Course|New|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Kathryn Ivey kbeaty@ufl.edu
Created	7/5/2018 2:07:03 PM
Updated	7/5/2018 2:09:18 PM
Description of request	Creation of permanent study abroad course for Family, Youth and Community Sciences. This program has been offered since 2013 and we feel a permanent number is needed rather than using a rotating topics code each year.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Family, Youth and Community Sciences 514932000	Tracy Irani		7/5/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			7/5/2018
No document changes					
University Curriculum Committee					
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 12849

Info

Request: FYC4XXX
Description of request: Creation of permanent study abroad course for Family, Youth and Community Sciences. This program has been offered since 2013 and we feel a permanent number is needed rather than using a rotating topics code each year.
Submitter: Kathryn Ivey kbeaty@ufl.edu
Created: 7/5/2018 1:30:32 PM
Form version: 1

Responses

Recommended Prefix FYC
Course Level 4
Number XXX
Category of Instruction Advanced
Lab Code None
Course Title Family and Cultural Diversity
Transcript Title FamCulturalDiversity
Degree Type Baccalaureate

Delivery Method(s) Off-Campus
Co-Listing No
Co-Listing Explanation N/A
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description This course develops knowledge about culturally diverse families in the United States and Europe. This knowledge is used to understand how programming might be developed in culturally appropriate ways, focuses on the strengths of families from diverse populations and identifies differences and similarities between various cultures and the dominant culture.
Prerequisites Application to study abroad program and approval by instructor
Co-requisites N/A
Rationale and Placement in Curriculum Additional course on family and cultural diversity as an elective for students in the Family, Youth and Community Sciences major as well as other students across campus interested in studying abroad
Course Objectives 1. Identify basic concepts, definitions, and approaches used in the study of multiculturalism.
1.1 Identify the history and cultural context of the family dynamics and values of diverse populations.
1.2 Identify the results of the interface of these family dynamics with the dominant culture.
1.3 Develop knowledge about the strengths of families from diverse cultures.
2. Apply thinking and other application skills in identifying the dynamics and values of culturally diverse families in the United States and Europe.
3. Practice the skills that will promote the development of cultural competencies among families of diverse cultures and how to help them feel culturally safe.

Course Textbook(s) and/or Other Assigned Reading Koppelman, K.L. Understanding human differences: Multicultural education for a diverse America (4th Ed. (or latest)). Boston, MA: Allyn & Bacon. ISBN 978-0-13-282489-7

Renard, J. (2012). The handy religion answer book. Detroit: Visible Ink Press. (2nd Ed. (or latest)). ISBN 978-1-57859-379--8

Supplemental Readings (Posted on e-Learning/Canvas)

Weekly Schedule of Topics DATE TOPIC
M 5/6
T 5/7
W 5/8
TH 5/10 Depart for Berlin
Arrive by 11:30 a.m. in Berlin, Tegel
Potsdam
Depart for Viadrina in Frankfurt (Oder)
F 5/11 Lecture 1: Course Overview (1-2)
Understanding Ourselves and Others (1-2)
Understanding Prejudice and Its Causes
Communication, Conflict, and Conflict
Resolution (1-2)
Guest Lecture I
Language Course (2 hr. block)
Sa 5/12-
Su 5/13 Optional Excursions (On Your Own) Dresden,
Leipzig, or Other Destinations
M 5/14 Lecture 2: Immigration and Oppression (1-2)
Race and Oppression (1-2)
Guest Lecture II
Info Meeting Croatia Trip
Cruise & Lunch on the Oder River
Language Course (2hr. block)
T 5/15 Group Travel to Croatia!
TH 5/25
F 5/26 Lecture 3: Religion and Oppression (1-2)
Rejecting Oppressive Relationships (1-2)

Sa 5-27 - M 5/29 Optional Excursions (On Your
Own) Dresden, Leipzig, or Other
Destinations
T 5/30 Lecture 4: Introduction to World
Religions (1-2)
Judaism (1-2)
Guest Lecture III
W 5/31 Lecture 5: Racism: Confronting a
Legacy of White Domination in
America
Christianity (1-2)
Service Learning
TH 6/01

Lecture 6: Sexism (1-2)
Islam (1-2)
Service Learning
F 6/02

Lecture 7: Heterosexism (1-2)
Hinduism (1-2)
Service Learning
Crash Course in Polish
S 6/03

Group Day Trip to Poznan,
Poland
Su 6/04

Jewish Museum in Berlin +
guided tour
M 6/5 Lecture 8: Classism (1-2)
Buddhism (1-2)
Service Learning
T 6/6 Lecture 9: Ableism (1-2)
Daoism (1-2)
Service Learning
Fairwell Dinner
GCFL Reaction Paper (1-2)
W 6/7 Lecture 10: Pluralism in
Schools/Society (1-2)
Confucianism (1-2)
Service Learning
Bonfire on the Island
Ziegenwerder
TH 6/8 Tying it all together. Departure

Links and Policies STUDENTS OFFICE.

Email & Web Access Requirement

All students are required to have a UF e-mail account and must be able to access e-Learning. You will be responsible for checking the course e-Learning site before each class (at least three times a week) for course calendar, lecture notes, assignments, e-mail, and posted announcements. If you are experiencing problems with e-Learning, call 352-392-HELP select option 7, or connect via email, (http://helpdesk.ufl.edu). Location: CSE 214/520. DO NOT CALL/EMAIL ME until you have a Ticket number from the HELP desk.

Software Use Policy
Copyright and Peer-to-Peer (P2P) Copyright infringement laws apply to UF's students, faculty and staff. Downloading and sharing copyrighted material is illegal. Penalties can range from $500-250,000, up to five years in prison, and suspension or dismissal from school. Please visit this page to learn copyright policies, guidelines and other related materials. http://www.it.ufl.edu/resources/copyright/

- Download a "Piracy is Illegal" poster to display as a reminder of why you shouldn't commit copyright infringement. http://infosec.ufl.edu/literature/piratebooty.pdf Retrieved August 6, 2006 from http://www.registrar.ufl.edu/catalog/policies/students.html

Service for Students with Disabilities

The Dean of Students Office provides individual assistance to students with documented disabilities based upon the need and impact of the specific disability. There is no requirement for a student to self-identify his/her disability. However, students requesting classroom accommodations must register with the Dean of Students Office in 202 Peabody Hall, 392-1261 (Voice)/392-3008 (TDD). Please contact me if you have questions or concerns in this regard.

Computing Desk Help

http://helpdesk.ufl.edu The UF Computing Help Desk is there to assist you with all your computing questions. Phone: 392-HELP, E-mail: helpdesk@ufl.edu, Location: CSE 214/520

Counseling Support Services

Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance. These resources include:
- UF Student Mental Health Services: (352) 392-1171

Daytime direct line: Mon. & Fri., 8-5; Tues./Wed./Thurs: 8-6. During hours when the SHCC facility is not open, call the same number to be referred to an on-call counselor. http://www.shcc.ufl.edu
- UF Counseling Center: (352) 392-1575 Daytime direct line M-F, 8-5. After hours, please see other numbers listed in this site: www.counsel.ufl.edu/

- Alachua County Crisis Center: (352) 264-6789
Phone counseling 24 hours a day, 7 days a week.
- Sexual Assault Recovery Services (SARS): Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center: Reitz Union, 392-1601, career development assistance and counseling.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation
0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Grading Scheme #1. Pop Quizzes, Reaction Papers, Class Activities, Attendance, Participation, and Group Discussions
(Drop 2)

200
#2-3. 2 Writing Assignments @ 100 points ea. 200
Final Exam

200
Total Points

600

Instructor(s) Dr. Victor William Harris

Cover Sheet: Request 12688

SWS 4XXX - Aquatic Toxicology: Science and Applications

Info

Process	Course|New|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Michael Sisk mjsisk@ufl.edu
Created	5/11/2018 3:21:36 PM
Updated	5/11/2018 3:30:17 PM
Description of request	New Undergraduate Course in Soil and Water Sciences Department

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Soil and Water Science 514921000	Konda Reddy		5/11/2018
SWS_4XXX_Aquatic_Toxicology_5_11_18.pdf SWS_5XXX_Aquatic_Toxicology_5_11_18.pdf Joint_Letter_Undergraduate_&_Graduate Coordinator.pdf UF_Env_Engineering_UCC_Consult_Aquatic_Toxicology.pdf UF_PHHP_UCC_Consult_Aquatic_Toxicology.pdf					5/11/2018 5/11/2018 5/11/2018 5/11/2018 5/11/2018
College	Pending	CALS - College of Agricultural and Life Sciences			5/11/2018
No document changes					
University Curriculum Committee					
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 12688

Info

Request: SWS 4XXX - Aquatic Toxicology: Science and Applications
Description of request: New Undergraduate Course in Soil and Water Sciences Department
Submitter: Michael Sisk mjsisk@ufl.edu
Created: 5/10/2018 2:14:53 PM
Form version: 1

Responses

Recommended Prefix SWS
Course Level 4
Number XXX
Category of Instruction Advanced
Lab Code None
Course Title Aquatic Toxicology: Science and Applications
Transcript Title Aquatic Toxicology
Degree Type Baccalaureate

Delivery Method(s) On-Campus
Co-Listing Yes
Co-Listing Explanation Students taking this course for graduate credit will be required to complete a special project for credit. Students will write a comprehensive term paper focused on a particular contaminant (or class of contaminants), its fate in the aquatic environment, and effects on aquatic biota (including modes of action, etc.). Graduate students will also be required to present their results in a 30 minute lecture to the class.
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description Introduces foundational knowledge and concepts of the field of aquatic toxicology. Examines how environmental and chemical properties influence the fate and bioavailability of contaminants in aquatic environments; introduces principles of toxicology and methods used to study aquatic toxicology, as well as applications of knowledge gained from aquatic toxicology studies.
Prerequisites BSC 2005 & BSC 2005L or BSC 2010 & BSC 2010L
CHM 2045 & CHM 2045L
CHM 2046 & CHM 2046L

Co-requisites None
Rationale and Placement in Curriculum This course broadly covers fundamentals of how environmental factors and chemical properties influence the fate and bioavailability of contaminants in the aquatic environment. It addresses principles of toxicology, methods used in the study of aquatic toxicology, and applications of knowledge gained from aquatic toxicology studies. The topic of aquatic toxicology is definitely pertinent to environmental applications of soil and water sciences. This course fills a gap in our curriculum, especially for students in the Water Science track.
Course Objectives Students will develop foundational knowledge needed to understand this multi-disciplinary field. After completing this course, students will be able to:

- identify and qualitatively describe how the unique, dynamic properties of chemicals and the environment influence the fate and bioavailability of contaminants in the aquatic environment.
- explain when and why some contaminants are toxic while others are not.
- identify and design toxicity tests based on data needs
- synthesize information from previous objectives and apply it for evaluating risks to aquatic

organisms.

Course Textbook(s) and/or Other Assigned Reading REQUIRED BOOK: An Introduction to Aquatic Toxicology (Mikko Nikinmaa, 2014) ISBN 978-0-12-411574-3.

RECOMMENDED BOOKS: Additional texts that may be useful include: Fundamentals of Aquatic Toxicology (Gary Rand ed., 1995) and Fundamentals of Ecotoxicology (Michael Newman 2015 or earlier). Additional handouts and references to specific topics may be given during the semester.
Weekly Schedule of Topics LECTURE SCHEDULE:

Week	Lecture	Topic	Quiz
Introductory materials			
1	1	Course introduction/Historical perspectives	
	2	Historical Perspectives	
	3	Brief introduction to aquatic toxicology	x
Factors affecting exposures			
2	4	Chemical factors affecting exposures	
	5	Chemical factors affecting exposures	
	6	Environmental (aquatic) factors affecting exposures	x
3	7	Exam 1	
Contaminants and toxicants			
	8	Toxic agents and contaminants	
	9	Toxic agents and contaminants	
Principles of toxicology			
4	10	Bioavailability	
	11	Bioavailability	
	12	Basic toxicological concepts and principles	x
5	13	Basic toxicological concepts and principles	
Uptake and elimination of contaminants			
	14	Uptake of Contaminants	
	15	Elimination of contaminants/bioaccumulation/bioconcentration	x
		Phase I metabolism	
6	16	Overview of Molecular aspects, activation-detoxification, and biomarkers	
	17	Phase I biotransformations-CYP450's	
	18	CYP450 regulation and inducibility	x
7	19	Other Phase I biotransformations	
	20	Exam 2	
	21	Phase II biotransformations	
8	22	Sequestration	x
Toxicity: modes-of-action			
	23	Oxidative stress and antioxidant response	
	24	Enzyme dysfunction and substrate pool shifts	
9	25	Stress proteins	x
	26	DNA modification	
	27	Effects on cells, tissues, and organs	
10	28	Exam 3	
	29	Contaminant-induced sublethal effects	
Methods used in aquatic toxicology			
	30	Organisms for aquatic toxicity testing	
11	31	Organisms for aquatic toxicity testing	
	32	Toxicity testing-introduction, test design, exposure systems	x
	33	Toxicity testing-introduction, test design, exposure systems	
12	34	Toxicity testing-introduction, test design, exposure systems	
	35	Factors affecting quantitative responses/sediment	x
	36	Quantitative estimators of effects	
13	37	Exam 4	
	38	Effects on populations	
	39	Effects on communities and ecosystems	
Applications of toxicity data for ecological risk assessment			
14	40	Ecological risk assessment	x
	41	Ecological risk assessment	
	42	*Graduate student presentations/Case studies	

15 43 Review for final exam

Links and Policies Grades and Grade Points
For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Attendance and Make-Up Work
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- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu

Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching

- U Matter We Care, www.umatter.ufl.edu/

- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/next-level

Student Complaints:

- Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf

Grading Scheme Undergraduate students

Evaluation endpoint	Frequency	% of total grade
Participation	Weekly	5
Quizzes and assignments	As announced	10
Exams 4	60	
Final exam	1	25

Grading Scale

A	93% and above	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	E	Below 60

Instructor(s) P. Chris Wilson
Office: 3167 McCarty Hall A
Office phone: 352-294-3166
Email: pcwilson@ufl.edu

UF | UNIVERSITY of FLORIDA

Institute of Food and Agricultural Sciences
Soil and Water Sciences Department

2181 McCarty Hall
PO Box 110290
University of Florida
Gainesville, FL 32611
Telephone: 352-294-3110
Fax: 352-392-3902
apatite@ufl.edu

September 29, 2017

Dear CALS Curriculum Committee:

We are requesting that the course titled "Aquatic Toxicology: Science and Applications", currently awaiting assignment of a unique course number, be approved as a 4XXX/5XXX co-taught course. This course broadly covers fundamentals of how environmental factors and chemical properties influence the fate and bioavailability of contaminants in the aquatic environment. It addresses principles of toxicology, methods used in the study of aquatic toxicology, and applications of knowledge gained from aquatic toxicology studies. The topic of aquatic toxicology is definitely pertinent to environmental applications of soil and water sciences. This course fills a gap in our curriculum, especially for students in the Water Science track. We are not aware of another course offered at the University of Florida that would deliver the targeted training and perspective provided by this proposed course.

Graduate students will be required to write a comprehensive term paper focused on a particular contaminant (or class of contaminants), its fate in the aquatic environment, and effects on aquatic biota. In addition, they will present their results in a 30-minute lecture to the class. This paper will constitute 15% of the final grade.

Please let us know if you have questions.

Thanks.

Dr. James Bonczek
Undergraduate Coordinator, Senior Lecturer, Soil and Water Sciences Department

Willie Harris

Dr. Willie Harris
Graduate Coordinator, Professor, Soil and Water Sciences Department

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Environmental Engineering Sciences	Professor and Department Head
Phone Number	**E-mail**
352-392-0845	cywu@ufl.edu

Comments

Department of Environmental and Global Health in College of Public Health and Center for Environmental and Human Toxicology in College of Veterinary Medicine offer courses in this subject area.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Environmental and Global Health	Joseph Bisesi, Assistant Professor
Phone Number	**E-mail**
(352) 294-4703	jbisesi@phhp.ufl.edu

Comments

We have reviewed the syllabus for the proposed aquatic toxicology course and found that while there is a areas which may overlap with content in PHC6937: Environmental Toxicology Concepts in Public Health and PHC6301: Aquatic Systems and Environmental Health, neither of these courses are specifically focused on aquatic toxicology and we feel there is a need for a course such as the one that was proposed here. We do not have any objections to the approval of this course.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

Aquatic Toxicology: Science and Applications
SWS 4XXX

3 credit hours – Spring Semesters

Instructor: P. Chris Wilson
Office: 3167 McCarty Hall A
Office phone: 352-294-3166
Email: pcwilson@ufl.edu

Office hours: Open door policy (If not regularly on my hallway, email for availability before coming or for appointment)

Course location: McCarty Hall B, Room 3124
meeting times: MWF 11:45 am

CATALOG DESCRIPTION: Introduces foundational knowledge and concepts of the field of aquatic toxicology. Examines how environmental and chemical properties influence the fate and bioavailability of contaminants in aquatic environments; introduces principles of toxicology and methods used to study aquatic toxicology, as well as applications of knowledge gained from aquatic toxicology studies.

COURSE OBJECTIVES: Students will develop foundational knowledge needed to understand this multi-disciplinary field. After completing this course, students will be able to:

- identify and qualitatively describe how the unique, dynamic properties of chemicals and the environment influence the fate and bioavailability of contaminants in the aquatic environment.
- explain when and why some contaminants are toxic while others are not.
- identify and design toxicity tests based on data needs
- synthesize information from previous objectives and apply it for evaluating risks to aquatic organisms.

DELIVERY METHOD: Hybrid course. Online lectures with weekly face-to-face meetings during 1 class period each week. Online lectures (powerpoint presentations) and other course materials delivered through the Canvas E-Learning System.

PRE-REQUISITES/CO-REQUISITES:
BSC 2005 & BSC 2005L or BSC 2010 & BSC 2010L
CHM 2045 & CHM 2045L
CHM 2046 & CHM 2046L
Or with consent from instructor

LECTURE SCHEDULE:

Week	Lecture	Topic	Quiz
		Introductory materials	
1	1	Course introduction/Historical perspectives	
	2	Historical Perspectives	
	3	Brief introduction to aquatic toxicology	x
		Factors affecting exposures	
2	4	Chemical factors affecting exposures	

	5	Chemical factors affecting exposures	
	6	Environmental (aquatic) factors affecting exposures	x
3	7	Exam 1	
		Contaminants and toxicants	
	8	Toxic agents and contaminants	
	9	Toxic agents and contaminants	
		Principles of toxicology	
4	10	Bioavailability	
	11	Bioavailability	
	12	Basic toxicological concepts and principles	x
5	13	Basic toxicological concepts and principles	
		Uptake and elimination of contaminants	
	14	Uptake of Contaminants	
	15	Elimination of contaminants/bioaccumulation/bioconcentration	x
		Phase I metabolism	
6	16	Overview of Molecular aspects, activation-detoxification, and biomarkers	
	17	Phase I biotransformations-CYP450's	
	18	CYP450 regulation and inducibility	x
7	19	Other Phase I biotransformations	
	20	Exam 2	
	21	Phase II biotransformations	
8	22	Sequestration	x
		Toxicity: modes-of-action	
	23	Oxidative stress and antioxidant response	
	24	Enzyme dysfunction and substrate pool shifts	
9	25	Stress proteins	x
	26	DNA modification	
	27	Effects on cells, tissues, and organs	
10	28	Exam 3	
	29	Contaminant-induced sublethal effects	
		Methods used in aquatic toxicology	
	30	Organisms for aquatic toxicity testing	
11	31	Organisms for aquatic toxicity testing	
	32	Toxicity testing-introduction, test design, exposure systems	x
	33	Toxicity testing-introduction, test design, exposure systems	
12	34	Toxicity testing-introduction, test design, exposure systems	
	35	Factors affecting quantitative responses/sediment	x
	36	Quantitative estimators of effects	
13	37	Exam 4	
	38	Effects on populations	
	39	Effects on communities and ecosystems	

Applications of toxicity data for ecological risk assessment			
14	40	Ecological risk assessment	x
	41	Ecological risk assessment	
	42	*Graduate student presentations/Case studies	
15	43	Review for final exam	

STUDENT ASSESSMENT:

1. You are expected to attend and be prepared to participate in all class sessions. A portion of the grade is based on meaningful class participation, demonstrated student interest, and overall student dedication.

2. Assessments are based on exams, quizzes, and participation in class.

3. Course grades will be determined as follows (%):

Undergraduate students

Evaluation endpoint	Frequency	% of total grade
Participation	Weekly	5
Quizzes and assignments	As announced	10
Exams	4	60
Final exam	1	25

Grading Scale

A	93% and above	C	73-76%
A-	90-92%	C-	70-72%
B+	87-89%	D+	67-69%
B	83-86%	D	63-66%
B-	80-82%	D-	60-62%
C+	77-79%	E	Below 60

Current UF grading policies for assigning grade points may be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

ATTENDANCE AND CONDUCT: Students should be ready to begin class as soon as the scheduled start time is reached (i.e. arrive early). Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx. Cell phones should be silenced during class.

COMMUNICATION. Students are encourage to always ask questions during class regarding subject material, assignments, etc. that they do not understand so that others may also benefit. Questions and discussions about personal issues (e.g. grades, make-up work, etc.) should take place one-on-one before/after class, during office hours, or by email.

REQUIRED BOOK: *An Introduction to Aquatic Toxicology* (Mikko Nikinmaa, 2014) ISBN 978-0-12-411574-3.

RECOMMENDED BOOKS: Additional texts that may be useful include: *Fundamentals of Aquatic Toxicology* (Gary Rand ed., 1995) and *Fundamentals of Ecotoxicology* (Michael Newman 2015 or earlier). Additional handouts and references to specific topics may be given during the semester.

COURSE FEEDBACK AND EVALUATION: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES: If you require classroom accommodation because of a disability, you must first register with the Disability Resource Center (352-392-8565; www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, you will receive an accommodation letter that must be presented to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework. Students needing accommodations should request them as early as possible in the semester.

ACADEMIC HONESTY: UF students are bound by The Honor Pledge, which states, " We, the members of the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty 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 (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) 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 in this class.

SOFTWARE USE: All faculty, staff and students of the University are required and expected to obey the 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.

CAMPUS RESOURCES

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek assistance from appropriate University resources.

Health and Wellness

U Matter, We Care

If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center

http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 911 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

The Student Health Care Center
Primary and specialty health care. http://shcc.ufl.edu/.

Alachua County Crisis Center
Crisis intervention is always available 24/7: (352) 264-6789.

Academic Resources

E-learning technical support
352-392-4357 (select option 2) or email to Learning-support@ufl.edu.
http://lss.at.ufl.edu/help.shtml.

Career Resource Center
Reitz union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu.

Library Support
http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center
Broward Hall, 392-2010 or 392-6420. General skills and tutoring. http://teachingcenter.ufl.edu.

Writing Studio
302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
http://writing.ufl.edu/writing-studio/.

Student Complaints
Campus: https://www.dso.ufl.edu/documents/UF_Complaints_Policy.pdf.
On-Line Students: http://www.distance.ufl.edu/student-complaint-process.

(12)

Cover Sheet: Request 12418

Certificate in Environment Microbiology

Info

Process	Certificate|New|Grad|Revised
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Jamie Foster jfoster@ufl.edu
Created	3/20/2018 1:30:08 PM
Updated	8/8/2018 12:27:32 PM
Description of request	This Graduate Certificate aims to provide students with a working knowledge of fundamentals and emerging areas in Environmental Microbiology. Recently, the field of Environmental Microbiology has taken on new importance in key areas of research, such as climate change, mitigating pollution through bioremediation, and the role of microbes in the built environment. The requirements for the Environmental Microbiology Online Certificate will provide students with expertise in this rapidly expanding field of microbiology. Students obtaining the certificate would acquire skills to assist them in understanding key concepts in microbial ecology, biogeochemistry, and advances in microbiome research. Additionally, students will develop core competency in current Environmental Microbiology technologies and evaluation strategies, synthesizing key primary literature in the field and building critical thinking and writing skills. We anticipate this online certificate program will encourage and facilitate non-degree students to enroll into our online masters program. This program is unique and would be the first certificate program for the department and therefore content would not overlap with other certificates at UF.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		8/8/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			8/8/2018
No document changes					
OIPR					
No document changes					
Graduate Council					
No document changes					
Graduate School Notified					
No document changes					
University Curriculum Committee Notified					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					

Step	Status	Group	User	Comment	Updated
Academic Assessment Committee Notified					
No document changes					
Student Academic Support System					
No document changes					
College Notified					
No document changes					

Certificate|New for request 12418

Info

Request: Certificate in Environment Microbiology
Description of request: This Graduate Certificate aims to provide students with a working knowledge of fundamentals and emerging areas in Environmental Microbiology. Recently, the field of Environmental Microbiology has taken on new importance in key areas of research, such as climate change, mitigating pollution through bioremediation, and the role of microbes in the built environment. The requirements for the Environmental Microbiology Online Certificate will provide students with expertise in this rapidly expanding field of microbiology.

Students obtaining the certificate would acquire skills to assist them in understanding key concepts in microbial ecology, biogeochemistry, and advances in microbiome research. Additionally, students will develop core competency in current Environmental Microbiology technologies and evaluation strategies, synthesizing key primary literature in the field and building critical thinking and writing skills.

We anticipate this online certificate program will encourage and facilitate non-degree students to enroll into our online masters program. This program is unique and would be the first certificate program for the department and therefore content would not overlap with other certificates at UF.

Submitter: Jamie Foster jfoster@ufl.edu
Created: 3/20/2018 1:08:30 PM
Form version: 1

Responses

Certificate Name Environmental Microbiology
Transcript Title Environmental Microbiology
Credits 13
Level Graduate
CIP Code 03.0104
Degree Program Environmental Science
Effective Term Fall
Effective Year 2018
Certificate Description This Graduate Certificate aims to provide students with a working knowledge of fundamentals and emerging areas in Environmental Microbiology. Recently, this field has taken on new importance in key areas of research, such as climate change, mitigating pollution through bioremediation, and the role of microbes in the built environment.

Requirements for Admission For entry into University of Florida's online graduate certificate in Environmental Microbiology students must have:

- A Bachelor of Arts (BA) or Bachelor of Science (BS) degree from an accredited institution.
- A strong science foundation, such as coursework related to microbiology, biology, ecology and chemistry (Note: online introductory microbiology courses are available to potential applicants if additional course work is needed, see below).

No GREs are required and students are allowed to enroll one semester at a time with no long-term commitment. Students are not required to enroll in a UF graduate degree program to complete the certificate. The completed credits with a grade of B or higher, however, can be applied to a future advanced degree in Microbiology and Cell Science at UF. Enrolled graduate students can earn this Environmental Microbiology Certificate to complement their current M.S. or Ph.D. degree programs.

Requirements for Completion To complete the certificate students must complete the following:

- MCB 6XXX Environmental Microbiology
- MCB 7922 Journal Colloquium in Environmental Microbiology.
- Any three (3) of the following courses:
  - MCB 6871 Archaea and Biotechnology
  - MCB 6xxx Astrobiology
  - MCB 6937 Bacterial Physiology

MCB 6151 Prokaryotic Diversity
MCB 6670c The Microbiome

- Students must have a C or higher in all courses
- Students must have a 3.0 overall GPA to receive the certificate

Required (4 credits total):
MCB 6XXX – Environmental Microbiology (3 credits; Fall) - Overview of microorganisms in the environment including: occurrence, abundance, and distribution, current research methodologies to decipher microbial processes and activities, marine microbial ecology, microbial interactions with the environment and practices of applied environmental microbiology. (Note: Approval Pending at CALS)

MCB 7922 – Journal Colloquium in Environmental Microbiology (1 credit; Fall/Spring) - This course is an online forum where students evaluate and discuss primary literature articles and technical reports in the field of Environmental Microbiology.

Three of the following Courses (9 credits total):
MCB 6781 Archaea and Biotechnology (3 credits; Fall) - Students will learn about the evolution, physiology, and molecular biology of Archaea including extremophiles. Principles of energy production and biosynthesis will be examined in aerobic and anaerobic habitats. Research that incorporates cutting-edge techniques and biotechnology applications for using archaea to solve real world problems will also be explored.

MCB 6XXX – Astrobiology (3 credits; Spring) - Astrobiology examines the origin, evolution, and future of life in our solar system. Topics include: biosphere formation, microbe-driven biogeochemistry, microbe adaptation to extreme environments, planetary habitability, and microbiology on the International Space Station. (Note: Approval Pending at CALS).

MCB 6937 – Bacterial Physiology (3 credits; Fall) - This course explores the structure and physiology of bacterial cells. The principles of energy and biosynthetic metabolism will be examined in aerobic and anaerobic micro-organisms. Several current research topics in microbiology will also be covered including quorum sensing, proteases, chaperones, and microbes in extreme environments. Topics in microbial biotechnology will be discussed such as improvements in the production of renewable fuels and chemicals and bioremediation.

MCB 6670C The Microbiome (3 credits; Spring) - Increase knowledge, appreciation and use of genomics pertaining to the breadth of microbial diversity across a wide variety of organisms and habitats using methods that do not require culturing of the myriad of inhabitants. Students will use tools, practice analysis and interpretation of genomic data sets to analyze different microbiomes.

MCB 6151 Prokaryotic Diversity (3 credits; Summer) – This course is an introduction to the diversity of Bacteria and Archaea. Discussions will provide a conceptual and historical framework for understanding their 1) origin and evolution; 2) morphological, metabolic, and molecular characteristics; 3) genetic and physiological diversity; 4) importance in human/animal/plant health; and 5) roles in elemental cycling.

An alternative and relevant course may be substituted for one of the certificate courses with advisor or program coordinator's permission.

Elective Course – This course does not count towards certificate program credits but may be recommended to students lacking a foundation in microbiology.

MCB 6937 Special Topics – Biology of Microorganisms (3 credits; Fall, Spring, Summer) – This course examines the structure, nutrition and growth of microorganisms; characterization of representative microorganisms and viruses; metabolic properties and introduction to microbial genetics, immunology and pathogenesis of microorganisms. Note this course is intended only for students who did not complete an upper division Microbiology course as an undergraduate student.

Suggested Semester-by-Semester Plan: The certificate program is designed to be completed in one academic year; however, there is no time limit for completed course certificate credits. Students may begin the program in any semester during the academic year and also have the option of including courses during the summer semester. Students must take a minimum of 13 credits from the course selection to complete the Environmental Microbiology certificate program.

A suggested plan is as follows:
Fall Semester: (6 or 7 credits)
MCB 6XXX – Environmental Microbiology (3)
MCB 6781 Archaea and Biotechnology (3) or MCB 6937 – Bacterial Physiology (3)
MCB 7922 – Journal Colloquium in Environmental Microbiology (1)

Spring Semester: (6 or 7 credits)
MCB 6XXX – Astrobiology (3) or MCB 6670C The Microbiome (3)
MCB 7922 – Journal Colloquium in Environmental Microbiology (1)

Summer Semester: (3 credits optional):
MCB 6151 Prokaryotic Diversity (3)

Rationale and Place in Curriculum The requirements for the Environmental Microbiology Online Certificate will provide students with expertise in this rapidly expanding field of microbiology.

Students obtaining the certificate would acquire skills to assist them in understanding key concepts in microbial ecology, biogeochemistry, and advances in microbiome research. Additionally, students will develop core competency in current Environmental Microbiology technologies and evaluation strategies, synthesizing key primary literature in the field and building critical thinking and writing skills.

We anticipate this online certificate program will encourage and facilitate non-degree students to enroll into our online masters program. This program is unique and would be the first certificate program for the department and therefore content would not overlap with other certificates at UF.

Student Learning Outcomes By the end of this certificate program graduate students should be able to:
1) Develop an in-depth comprehension and mastery of the fundamental concepts and methodology of environmental microbiology;
2) Analyze and discuss primary literature in the field of environmental microbiology to improve critical thinking and evaluation skills;
3) Refine scientific communication skills through writing scientific critiques, blogs and abstracts of primary literature articles; and
4) Improve their professional development through an increased awareness of library resources and professional societies, journals, and meetings.

Cover Sheet: Request 12164

Environmental Education and Communication

Info

Process	Certificate|Close/Modify|Grad|Revised
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Sandra Houder shouder@ufl.edu
Created	12/12/2017 1:24:51 PM
Updated	4/10/2018 2:45:00 PM
Description of request	Reason for the revision: Retirements have changed the course offerings. Due to fewer courses in environmental education being offered on campus, we have restructured the certificate to allow everyone to have at least one core class.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Forest Resources and Conservation 514946000	Terrell Baker III		12/12/2017
No document changes					
College	Approved	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Approved by the CALS CC on 1/12/18.	1/18/2018
No document changes					
Graduate Council	Recycled	GRAD - Graduate Council	Stacy Wallace	After discussions between our Associate Dean and Dr. Brendemuhl, it has been determined that the college would like to bring this proposal back to the unit for further updates and revisions. In turn, I am recycling this proposal as requested.	4/10/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			4/10/2018
No document changes					
Graduate Council					
No document changes					
Graduate School Notified					
No document changes					
University Curriculum Committee Notified					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					

Step	Status	Group	User	Comment	Updated
Academic Assessment Committee Notified					
No document changes					
Student Academic Support System					
No document changes					
College Notified					
No document changes					

Certificate|Close-Modify for request 12164

Info

Request: Environmental Education and Communication
Description of request: Reason for the revision: Retirements have changed the course offerings. Due to fewer courses in environmental education being offered on campus, we have restructured the certificate to allow everyone to have at least one core class.
Submitter: Sandra Houder shouder@ufl.edu
Created: 12/1/2017 1:18:00 PM
Form version: 1

Responses

Current Certificate Name Environmental Education & Communication
Effective Term Earliest Available
Effective Year Earliest Available
Requested Action Other (selecting this option will open additional form fields below)
Change Certificate Name? No
Proposed Certificate Name N/A
Change Certificate Name on Transcript? No
Current Transcript Name N/A
Proposed Transcript Name (21 char. max) N/A
Change Credit Hours? No
Current Credit Hours more than 12 (please detail in description how many credits)
Proposed Credit Hours more than 12 (please detail in description how many credits)
Change Certificate Description? No
Current Certificate Description Addresses issues related to education and communication as they relate to the management of the environment and natural resources. Coursework is in education and communication theory and practice, ecological science, and human and environment interactions.
Proposed Certificate Description (50 word max) N/A
Change Certificate Prerequisites? No
Current Prerequisites Students must be current UF graduate degree-seeking students.
Proposed Prerequisites N/A
Change Certificate Requirements? Yes
Current Requirements Students must complete 15 credits (five courses) in the following distribution.
Take 6 credits from Group
1 and 3 credits from each of Group 2, 3 and 4. Students must earn a minimum grade of "B" in all courses
used toward this certificate. A maximum of one substitute course may be considered upon petition.
Group 1: Environmental Education and Communication Theory and Practice (Complete 6 credits)
• AEC6540 Agricultural and Natural Resources Communications Theory and Strategies - 3 credits, letter-graded
• FNR5072C Environmental Education Program Development - 3 credits,letter-graded
• FOR6005 Conservation Behavior - 3 credits, letter-graded
• LAS6291 Conservation and Development Skills - 3 credits,letter-graded
• SCE6045 Environmental Education Materials and Methods - 3 credits,letter-graded
• SCE6246 Science Instruction in Informal Settings - 3 credits,letter-graded
• SCE6647 Global Studies Methods in Science Education - 3 credits,letter-graded
• WIS6525 Environmental Interpretation - 3 credits,letter-graded
Group 2: Ecological Science (Complete 3 credits)
• BOT5695C Ecosystems of Florida - 3 credits, letter-graded
• EES5315 Ecology and the Environment - 3 credits, letter-graded
• EES6308C Wetland Ecology - 3 credits, letter-graded
• FAS6272 Marine Ecological Processes - 3 credits,letter-graded
• PCB5356 Tropical Ecology - 3 credits, letter-graded
• SWS5235 South Florida Ecosystems - 3 credits, letter-graded
• WIS555C Conservation Biology - 3 credits, letter-graded
• WIS6468 Pattern and Process in Landscape Ecology - 3 credits,letter-graded
• WIS6934 Climate Change Ecology – 2-credits, letter-graded (Special Topics in WEC, permanent course number TBA)

Group 3: Social Dimensions of Human-Environment Interactions (Complete 3 credits)
• AEB7453 Natural Resource and Environmental Economics - 3 credits,letter-graded
• AEC5541 Communication and Instructional Technologies in Agricultural and Life Sciences - 3 credits, letter-graded
• AEC6552 Evaluating Programs in Extension Education - 3 credits,letter-graded
• ARC6391 Architecture, Energy, and Ecology - 3 credits,letter-graded
• CPO6795 Environmental Politics - 3 credits,letter-graded
• EES6009 Ecological Economics - 3 credits,letter-graded
• ENV5075 Environmental Policy - 3 credits, letter-graded
• FNR6669 Natural Resource Policy and Economics - 3 credits,letter-graded
• FYC6620 Program Planning and Evaluation for Human Service Delivery – 3 credits,letter-graded
• GEO6938 Protected Areas Management – 3-credits, letter-graded (special topics in Geography, permanent course number TBA)
• GLY6075 Global Climate Change: Past, Present, and Future - 3 credits,letter-graded
• MMC6660 Mass Communication and Society - 3 credits,letter-graded
• REL6183 Religion and Environmental Ethics - 3 credits,letter-graded
• WIS6578 Human Dimensions of Biological Conservation - 3 credits,letter-graded
Group 4: Sustainable Resource Management (Complete 3 credits)
• EVR6320 Sustainable Natural Resource Management - 3 credits,letter-graded
• FAS6355C Fisheries Management - 3 credits,letter-graded
• FOR5157 Ecology Restoration Principles and Practices - 3 credits,letter-graded
• FOR6665 Landscape Planning for Ecotourism - 3 credits,letter-graded
• FOR6628 Community Forest Management - 3 credits,letter-graded
• FOR6934 Natural Resources in a Changing Climate (Special Topics in FRC, permanent course number TBA) – 3-credits, letter-graded
• FYC6302 Sustainable Community Development - 3 credits, lettergraded
• LAS6290 Tropical Conservation and Development - 3 credits,letter-graded
• LEI6325 Ecotourism - 3 credits, letter-graded
• WIS6543 Wildlife and Agriculture - 3 credits,letter-graded
SUMMATIVE ESSAY
In addition to completing a total of 5 courses representing the required categories on the approved course list, the EE&C Certificate requires a summative assessment of your mastery of environmental
education and communication knowledge and skills. A written essay should be submitted it to Dr. Martha Monroe (mcmonroe@ufl.edu) by mid-semester of the semester you intend to apply to complete
the EEC Certificate.
The essay should be approximately 750 words and should describe how you would use the EE&C
strategies you learned in your coursework to achieve a particular education or communication goal of your choosing. You may use an actual or hypothetical situation to respond to the items below. Include the following components in your essay:
A. A description of an environmental, problem, issue, or situation that requires a targeted education or communication program. Please explain why EE&C is an appropriate strategy for addressing this problem, issue, or situation. Describe two theories that you would use to help guide your education or communication effort as you developed your program oractivity.
B. A description of the target audience for your education or communication effort. Please include the age range targeted and other relevant demographic characteristics of your target audience as well as a description of the specific context in which your education or communication program would be delivered (classroom, visitors to a particular informal setting, residents, training, etc.)
C. A description of how your education or communication program would be delivered (e.g., a face-to-face audiovisual presentation, a regional mass media campaign, a district-wide school based program, an interactive website, a podcast orwebinar).
D. A description of three desired learning outcomes for your target audience (objectives) that clearly identify specific knowledge, attitudes, skills, and/or behavioral outcomes of your program.
E. A description of two evaluation methods you would use to assess the success of your program.
Proposed Requirements Requirements
Students must complete at least one course in each group to total at least 15 credits:
A maximum of one substitute course may be considered upon petition, which must be submitted prior to applying to complete the certificate.

Group 1: Environmental Education and Communication Theory and Practice
FNR5072C Environmental Education Program Development - 3 credits, letter-graded
FOR6005 Conservation Behavior - 3 credits, letter-graded
WIS6525 Environmental Interpretation - 3 credits, letter-graded

Group 2: Education and Communication Theory and Practice
AEC6540 Agricultural and Natural Resources Communications Theory - 3 credits, letter-graded
FNR5072C Environmental Education Program Development - 3 credits, letter-graded
FOR6005 Conservation Behavior - 3 credits, letter-graded
FYC6620 Program Planning and Evaluation for Human Service Delivery – 3 credits, letter-graded
LAS6291 Communication and Leadership Skills for Development Practice - 3 credits, letter-graded (Special topics in Latin American Studies, permanent course number TBA)
LAS6291 Facilitation Skills for Collaborative Management 3 credits, letter-graded (Special topics in Latin American Studies, permanent course number TBA)
MMC5006 Introduction to Multimedia – 3 credits, letter-graded
MMC6409 Science and Health Communication – 3 credits, letter-graded
WIS6525 Environmental Interpretation - 3 credits, letter-graded
ZOO6927 Creative Scientific Communication – 2 credits, letter-graded

Group 3: Ecological Science
BOT5695C Ecosystems of Florida - 3 credits, letter-graded
EES6308C Wetland Ecology - 3 credits, letter-graded
FAS6272 Marine Ecological Processes - 3 credits, letter-graded
PCB5356 Tropical Ecology - 3 credits, letter-graded
SWS5235 South Florida Ecosystems (also WIS 6934) - 3 credits, letter-graded
WIS5555C Conservation Biology - 3 credits, letter-graded
WIS6468 Pattern and Process in Landscape Ecology- 3 credits, letter-graded
WIS6934 Global Change Biology – 3 credits, letter-graded (Special Topics WEC, permanent course number TBA)

Group 4: Social Dimensions of Human-Environment Interactions
AEB7453 Natural Resource and Environmental Economics - 3 credits, letter-graded
AEC5541 Communication and Instructional Technologies in Agricultural and Life Sciences - 3 credits, letter-graded
AEC6552 Evaluating Programs in Extension Education- 3 credits, letter-graded
ARC6391 Architecture, Energy, and Ecology - 3 credits, letter-graded
CPO6795 Environmental Politics - 3 credits, letter-graded
ENV5075 Environmental Policy - 3 credits, letter-graded
FNR6669 Natural Resource Policy and Economics - 3 credits, letter-gradedFOR6934 Environment and Society– 3 credits, letter-graded (Special Topics SFRC, permanent course number TBA)
FNR6061 Conflict and Collaboration in Natural Resources - 3 credits, letter-graded
GLY6075 Global Climate Change: Past, Present, and Future - 3 credits, letter-graded
LAS 6291 Conflict and Collaboration Management - 3 credits, letter-graded
.MMC6660 Mass Communication and Society - 3 credits, letter-graded
REL6183 Religion and Environmental Ethics - 3 credits, letter-graded
WIS6578 Human Dimensions of Biological Conservation - 3 credits, letter-graded

Group 5: Sustainable Resource Management
EVR6320 Sustainable Natural Resource Management - 3 credits, letter-graded
FAS6355C Fisheries Management - 3 credits, letter-graded
FOR5157 Ecology Restoration Principles and Practice - 3 credits, letter-graded
FOR6665 Landscape Planning for Ecotourism - 3 credits, letter-graded
FOR6628 Community Forest Management - 3 credits, letter-graded
FOR6934 Natural Resources in a Changing Climate (Special Topics)
FYC6302 Sustainable Community Development - 3 credits, letter-graded
LAS6290 Tropical Conservation and Development - 3 credits, letter-graded
LEI6325 Ecotourism - 3 credits, letter-graded
WIS6543 Wildlife and Agriculture - 3 credits, letter-graded

In addition to completing a total of 5 courses representing the required categories on the approved course list, the EE&C Certificate requires a summative assessment of your mastery of environmental
education and communication knowledge and skills. A written essay should be submitted it to Dr. Martha Monroe (mcmonroe@ufl.edu) by mid-semester of the semester you intend to apply to complete
the EEC Certificate.
The essay should be approximately 750 words and should describe how you would use the EE&C
strategies you learned in your coursework to achieve a particular education or communication goal of your choosing. You may use an actual or hypothetical situation to respond to the items below. Include the following components in your essay:
A. A description of an environmental, problem, issue, or situation that requires a targeted education or communication program. Please explain why EE&C is an appropriate strategy for addressing this problem, issue, or situation. Describe two theories that you would use to help guide your education or communication effort as you developed your program oractivity.
B. A description of the target audience for your education or communication effort. Please include the age range targeted and other relevant demographic characteristics of your target audience as well as a description of the specific context in which your education or communication program would be delivered (classroom, visitors to a particular informal setting, residents, training, etc.)
C. A description of how your education or communication program would be delivered (e.g., a face-to-face audiovisual presentation, a regional mass media campaign, a district-wide school based program, an interactive website, a podcast orwebinar).
D. A description of three desired learning outcomes for your target audience (objectives) that clearly identify specific knowledge, attitudes, skills, and/or behavioral outcomes of your program.
E. A description of two evaluation methods you would use to assess the success of your program.
Impact on Program Students who are already enrolled in the current Graduate Certificate will be able to complete the existing requirements or switch to this version if that suits their needs. We believe this version is more flexible and includes new courses; we do not foresee any complications.
Rationale for Proposed Change(s) Reason for the revision: Retirements have changed the course offerings. Due to fewer courses in environmental education being offered on campus, we have restructured the certificate to allow everyone to have at least one core class.
Assessment Data Review SLOs and assessments methods will not change (summative essay scored with rubric).
Academic Assessment Plan Changes No changes needed due to proposed change in certificate requirements.
Minor edits to AAP needed to reflect that the certificate is co-administered by SFRC and WEC and not just SFRC, and deletion of a line in the Mission Alignment section that references nondegree students (nondegree students cannot complete this certificate).

(14)

Cover Sheet: Request 11996

Bachelor of Science - Multi-/Interdisciplinary Studies, Other

Recycled

Info

Process	Program|Change name|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Michael Sisk mjsisk@ufl.edu
Created	11/1/2017 11:25:08 AM
Updated	3/14/2018 11:54:36 AM
Description of request	Shortening the Name of the Concentration to Environmental Management For Our Interdisciplinary BS Degree Program. This change applies to both our on-campus residential program (IS - Track of EMN) and our UF Online program (IS - Track of EMD).

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Soil and Water Science 514921000	Konda Reddy		11/1/2017
Change of Major Name IS-EMANR.pdf environmental-managementmajor.doc.pdf environmental-management-onlinemajor.doc.pdf alcenvironmental-management-in-agriculture-and-natural-resources.aspx.pdf					11/1/2017 11/1/2017 11/1/2017 11/1/2017
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Recycled to the department. Comments from the CALS CC have been sent to the department. Once those concerns are addressed request can be sent back to the CALS CC.	12/4/2017
No document changes					
Department	Approved	CALS - Soil and Water Science 514921000	Konda Reddy		3/14/2018
UF_Environmental_Engineering_UCC_Consult.pdf UF_College_of_Design_Construction__Planning_UCC_Consult.pdf EMANR Historical Information.pdf					3/14/2018 3/14/2018 3/14/2018
College	Pending	CALS - College of Agricultural and Life Sciences			3/14/2018
No document changes					
AP for Undergraduate Affairs					
No document changes					
University Curriculum Committee					
No document changes					
Faculty Senate Steering Committee					
No document changes					
Faculty Senate					
No document changes					

Step	Status	Group	User	Comment	Updated
Academic Affairs					
No document changes					
Board of Trustees Notified					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
Academic Assessment Committee Notified					
No document changes					
College Notified					
No document changes					

Program-Major/|Change_Name for request 11996

Info

Request: Bachelor of Science - Multi-/Interdisciplinary Studies, Other
Description of request: Shortening the Name of the Concentration to Environmental Management For Our Interdisciplinary BS Degree Program. This change applies to both our on-campus residential program (IS - Track of EMN) and our UF Online program (IS - Track of EMD).
Submitter: Michael Sisk mjsisk@ufl.edu
Created: 10/27/2017 12:50:06 PM
Form version: 1

Responses

Current Degree Program Name Bachelor of Science -Multi-/Interdisciplinary Studies, Other
CIP Code 309999
Requested Name Change Change the name of a major.
Proposed Degree Program Name Interdisciplinary Studies - Environmental Management
Current Major Name Interdisciplinary Studies - Concentration in Environmental Management in Agriculture and Natural Resources
Proposed Major Name Interdisciplinary Studies - Concentration in Environmental Management
Current Major Code IS
Proposed Major Code IS
Effective Term Earliest Available
Effective Year Earliest Available
Pedagogical Rationale/Justification This request is to change the major name for both our on-campus residential program (IS with a track of EMN) and UF Online program (IS with a track of EMD).
****

The Interdisciplinary Studies Major with Concentration Environmental Management in Agriculture and Natural Resources has caused much confusion to students over the past years especially as it moved into the UF Online program. Due to the length of the degree name, UF Online and CALS administrators agreed to represent the degree as UF Online – Environmental Management as the length of the complete degree title is cumbersome. There is some explanation on the website which explicitly states the degree major is Interdisciplinary Studies and what would appear on the transcripts. However, many students do not understand what Interdisciplinary Studies entails and relate much more readily to Environmental Management.

As we move into the future we would like to eventually change the name of the program to a BS in Environmental Management. We have been advised that moving the degree out of the Interdisciplinary Studies umbrella would require us to apply for a new degree program. We are not allowed to just remove IS from the name.

As a first step, we would like to condense the Concentration name to "Environmental Management". This would remove the "in Agriculture and Natural Resources" and align the name more to that marketed by UF Online. After this has been done we plan to undertake the process of changing the degree from an IS-Environmental Management to Environmental Management. This process will take some time and effort and may not be completed for several years.

Assessment Data Review We reviewed our SLO's and Program Goals, this is such a minor change, there will be no need to adjust our SLO's and/or Program Goals. If approved, we will will need to update the way the major is listed in these documents.
Academic Learning Compact and Academic Assessment Plan We reviewed our Academic Learning Compact and AAP/Program Goals, this is such a minor change, there will be no need to

adjust these documents. If approved, we will will need to update the way the major is listed in these documents.

EMA Undergraduate Program

Background

The Environmental Management in Agriculture (EMA) major is an interdisciplinary studies major in the College of Agriculture and Life Sciences (CALS). It was initiated several years ago (~10) in response to a CALS survey of potential employers that asked a question something along these lines: How can we better train our students to meet your needs? One of the requests that seem to surface quite often was: we need students that have a basic understanding of environmental issues and how to deal with them along with some more basic knowledge in specific areas. A CALS committee was formed to address this concern and the present EMA program originated from the recommendations of that committee.

The EMA brochure states that "this major is for University of Florida students who desire education in environmental management with substantial emphasis on agriculture. The EMA major is designed to integrate the mix of agricultural and environmental issues which need to be addressed in modern agriculture."

There are three specializations within EMA.

Economics and Policy: this specialization is designed to prepare students for employment with agribusinesses, chemical manufacturing firms, consulting companies, or regulatory agencies that are involved with environmental policies and regulations. Students are advised through the Food and Resource Economics Department.

Land and Water Management: This specialization prepares students for employment with agencies and firms that deal with technical aspects of the environmental management of land and water resources. Students are advised through the Soil and Water Science Department.

Waste Management and Utilization: This specialization prepares students for employment with firms and agencies involved in environmentally-sound use and management of agricultural and other wastes (poultry and dairy waste, municipal biosolids and effluent, yard waste, hazardous wastes, etc.). Students are advised through the Agricultural and Biological Engineering Department.

Present Situation

This major has not attracted students as originally anticipated. Over the years, we have had as high as 20-25 students in the program and we are presently in the middle teens. Part of the problem has been that EMA really does not have a home within CALS plus each of the advising departments has similar specialization within their own programs that tend to capture students interested in EMA. Others have suggested that the word "agriculture" in the title may make potential students less interested in the major.

Current Re-evaluation of the EMA Major

The Indian River Research and Education Center (IRREC) has expressed interest in including the EMA major in their program offerings. This started a re-evaluation of the EMA major in an attempt to make it more attractive to students. Brainstorming sessions have been held with Drs. van Bolkland (Professor and Programme Director, IRREC) and Jane Luzar (Associate Dean, CALS).

The current thinking is to give EMA a home within the Soil and Water Science Department and develop the curricula around the "Land and Water Management" specialization. The "Economics and Policy" and "Waste Management and Utilization" specializations would be woven into similar specializations already covered in the Food and Resource Economics and Agricultural and Biological Engineering Departments. It has also been suggested that the name of the major be changed to "Environmental Management in Agriculture and Natural Resources. The preferred name would be "Environmental Management" but is anticipated that there would be too many objections to this broad title from other disciplines, both within CALS and the University.

With this in mind, P.J. van Blokland and I have been working on an EMA (EMANR) curricula that would fit the intent of the major and that also could be offered at IRREC. For the IRREC program, we are proposing a mix of courses that are taught at IRREC and some distance ed courses. There are still a few issues to be resolved but overall, I believe that program is coming together in a fashion that will provide a strong EMANR curricula that can be used both on the UF campus in Gainesville and at IRREC. Recently Dr. Jeff Mullahey expressed interest in this program for the West Florida REC Milton campus and I am providing this information to him for evaluation.

Following is the working copy of the EMANR program as it now exists.

Proposed Curricula
for
Environmental Management in Agriculture and Natural Resources

Lower Division Requirements

Physical Sciences
CHM 2045 and CHM 2046
CHM 2045L and CHM 2046L
PHY 2020

Biological Sciences
BSC 2010, BSC 2010L
BSC 2011, BSC 2011L

Communications
AEE 3030 and AEE 3033
or SPC 2600 and ENC 2210

Economics
ECO 2023 or AEB 3103

Mathematics
MAC 2233

Statistics
STA 2023

Core Curriculum Requirements – 35 hours		Hours	DE/IRREC
SOS 3022	Soils in the Environment	3	DE
ALS 3133	Agriculture and Environmental Quality	3	DE
ALS 3153	Agricultural Ecology	3	
ALS XXXX	Contribution of Agribusiness to Florida's Economy	3	IRREC
AEB 4123	Agricultural Law	4	IRREC
SOS 3XXX	Environmental Sampling Techniques	3	DE
SOS 4245	Water Resource Sustainability	3	DE
PMA 3010	Fundamentals of Pest Management	3	DE
GLY 2038C	Geology and the Environment	4	DE
AEB 3450	Natural Resource and Environmental Economics	3	IRREC
AEB 4274	Natural Resource and Environmental Policy	3	DE

Areas of Specialization - 25 hours

Areas of Specialization include: 1) land and water management and 2) Ag business.
Students must see their advisor to select approved electives. Electives are chosen based on the student's choice of an Area of Specialization (AoS).

Land and Water Management Specialization		Hours	DE
SOS 3022L	Soils in the Environment Lab	1	DE
SOS 4231C	Soil, Water, and Land-use	3	DE
SOS 4720C	GIS in Soil and Water Science	3	DE
SOS 4244	Wetlands	3	DE
SOS 4715C	Environmental Pedology	4	DE
AOM 4643	Prin. And Issues in Environmental Hydrology	3	
	Approved electives	8	

Ag Business Specialization
To be patterned after the FRED "Management and Sales in Agribusiness" minor

UF | UNIVERSITY of FLORIDA

UF/IFAS
Soil and Water Sciences Department

2181 McCarty Hall A
PO Box 110290
Gainesville, FL 32611-0290
352-294-3151
352-392-3399 Fax

To Whom It May Concern:

The Interdisciplinary Studies Major with Concentration Environmental Management in Agriculture and Natural Resources has caused much confusion to students over the past years especially as it moved into the UF Online program. Due to the length of the degree name, UF Online and CALS administrators agreed to represent the degree as UF Online – Environmental Management as the length of the complete degree title is cumbersome. There is some explanation on the website which explicitly states the degree major is Interdisciplinary Studies and what would appear on the transcripts. However, many students do not understand what Interdisciplinary Studies entails and relate much more readily to Environmental Management.

As we move into the future we would like to eventually change the name of the program to a BS in Environmental Management. We have been advised that moving the degree out of the Interdisciplinary Studies umbrella would require us to apply for a new degree program. We are not allowed to just remove IS from the name.

As a first step, we would like to condense the Concentration name to "Environmental Management". This would remove the "in Agriculture and Natural Resources" and align the name more to that marketed by UF Online. After this has been done we plan to undertake the process of changing the degree from an IS-Environmental Management to Environmental Management. This process will take some time and effort and may not be completed for several years.

Sincerely,

Susan Curry
Senior Lecturer
Environmental Management Program Director
UF/IFAS Soil and Water Sciences Department

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
College of Design, Construction and Planning	Abdol Chini, Associate Dean for Undergraduate Education
Phone Number	**E-mail**
352-294-1407	chini@ufl.edu

Comments

The College of Design, Construction and Planning has no concerns about the proposal to change the major in Interdisciplinary Studies with a Concentration in Environmental Management in Agriculture and Natural Resources to the major in Interdisciplinary Studies with a Concentration in Environmental Management.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Environmental Engineering Sciences	Chang-Yu Wu, Professor and Department Head
Phone Number	**E-mail**
352-392-0845	cywu@ufl.edu

Comments

Many environmental management jobs, especially those related to utilities and infrastructure, require environmental engineering training and many mandate a professional license, which can only be obtained from an ABET accredited program. The proposed change may mislead students enrolled in the EM program to believe that they can seek any job related to EM, while in reality they won't be to be hired to those jobs mentioned above, thus a liability issue to the University. Every year there are quite a few students transfered from the current SWS program for this reason.

Department	Name and Title
Phone Number	**E-mail**

Comments

Hence, EES is against the change. If it is for a condensed title, "Agricultural Environment Management" or "Environmental Management in Soil and Water Sciences" may be better.

Department	Name and Title
Phone Number	**E-mail**

Comments

Interdisciplinary Studies: Environmental Management

Deleted: in Agriculture and Natural Resources

The interdisciplinary major in environmental management provides students with the scientific and technical foundation to integrate and communicate the diverse environmental issues associated with agriculture and natural resources. Students will be able to deal in an informed manner with the agricultural regulations and permitting requirements established by various agencies and jurisdictions, and students will achieve an appreciation for the complexities of agricultural practices. Students will learn to integrate, balance and communicate the mix of agricultural and environmental issues that need to be addressed in modern society.

Deleted: in agriculture

Interdisciplinary Studies: Environmental Management major page, on campus
Interdisciplinary Studies: Environmental Management major page, UF Online

Deleted: in Agriculture and Natural Resources

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Deleted: in Agriculture and Natural Resources

Before Graduating Students Must

- Complete an approved senior-year research project, SWS 4905 Individual Work, related to management and science skills.
- Achieve minimum grades of C in AEC 3030C and AEC 3033C. These courses are graded using rubrics developed by a faculty committee.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major will Learn to

Student Learning Outcomes (SLOs)

1. Appraise similarities between agronomic production and environmental protection issues.
2. Describe the role of soil and water in transport of contaminants in ecosystems and illustrate the interconnectedness of ecosystems and ecosystem components with specific examples.
3. Cite specific examples of natural resources and environmental public policy issues and identify contending stakeholder interests with respect to each issue.
4. Develop a plan for the analysis of an environmental / agricultural study using geographic information systems software.
5. Critically evaluate natural resource policies using basic economic tools and applying ecological, social and political criteria.
6. Create, interpret and analyze written text, oral messages and multimedia presentations used in agricultural and life sciences.

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Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Courses	Content		Critical Thinking			Communication
	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5	SLO 6
AEB 3133					I	
AEC 3030C						I, R, A
AEC 3033C						I, R, A
ALS 3133	I, A	I	I			
AOM 4643	R	R		I		
FNR 4660			R, A		R, A	R
SWS 3022		I				
SWS 4116	R					R
SWS 4223	R	R, A				R
SWS 4720C				R, A		R

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Assessment Types

- Projects
- Papers
- Presentations
- Exams

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Environmental Management: Interdisciplinary Studies

Deleted: in Agriculture and Natural Resources

Deleted:

This degree program uses an interdisciplinary approach to provide the scientific and technical foundation needed to integrate and communicate the diverse environmental issues associated with urban, agricultural, and natural ecosystems. Students develop an understanding of the best use of our natural resources for their social and economic benefits while protecting associated resource values, property rights and the environment. This degree provides a solid grounding in the areas of hydrology, soil science, pest management, water resources, and agricultural ecology.

About this Major

- **College:** Agricultural and Life Sciences
- **Degree:** Bachelor of Science
- **Credits for Degree:** 120
- **Academic Learning Compact**
- **Additional Information**

- **Related Interdisciplinary Studies: Environmental Management Programs**

Deleted: in Agriculture and Natural Resources

To graduate with this major, students must complete all university, college, and major requirements.

Critical Tracking Model Semester Plan

Overview

This major is for students who desire education in environmental management with substantial emphasis on agriculture and natural resources.

Graduates will find employment with agricultural producers, consulting companies and government agencies that are involved in maintaining a sustainable environment.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete 1 of 6 critical-tracking courses, excluding labs: AEC 3030C or SPC 2608, BSC 2005/2005L or BSC 2010/2010L, CHM 2045/2045L, CHM 2046/2046L, MAC 2233, STA 2023
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 2 additional critical-tracking courses, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 2 additional critical-tracking courses, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete 1 additional critical-tracking course, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete all critical-tracking courses, including labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

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Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

Semester 1	Credits

CHM 2045 General Chemistry 1, *3 credits, and* **CHM 2045L General Chemistry 1 Laboratory**, *1 credit*	**4**
State Core GE-B or P	
Composition *State Core GE-C; WR*	3
Elective	2
Humanities *State Core GE-H*	3
Social and Behavioral Sciences *State Core GE-S*	3
Total	15

Semester 2	**Credits**
AEB 2014 Economic Issues, Food and You, *3 credits, or* ECO 2013 Principles of Macroeconomics, *4 credits, or* ECO 2023 Principles of Microeconomics, *4 credits* *GE-S*	3-4
CHM 2046 General Chemistry 2, *3 credits, and* **CHM 2046L General Chemistry 2 Laboratory**, *1 credit* *GE-P*	4
IUF 1000 What is the Good Life *GE-H*	3
STA 2023 Introduction to Statistics 1 *GE-M*	**3**
Composition *GE-C; WR*	3
Total	16-17

Semester 3	**Credits**
AEC 3030C Effective Oral Communication *or* **SPC 2608 Introduction to Public Speaking**	**3**
BSC 2005 Biological Sciences, *3 credits, and* **BSC 2005L Laboratory in Biological Sciences**, *1 credit* *OR* **BSC 2010 Integrated Principles of Biology 1**, *3 credits, and* **BSC 2010L Integrated Principles of Biology 1 Laboratory**, *1 credit* *GE-B*	**4**
GLY 2030C Environmental and Engineering Geology *GE-P*	3
PHY 2020 Principles of Physics *or* PHY 2004 Applied Physics 1 *GE-P*	3
Elective	3
Total	16

Semester 4	Credits
ALS 3133 Agricultural and Environmental Quality *GE-P*	3
MAC 2233 Survey of Calculus 1 *State Core GE-M*	**3**
Electives	4
Humanities *(GE-H) or* Social and Behavioral Sciences *(GE-S)*	3
	Total 13

Semester 5	Credits
AEC 3033C Research and Business Writing in Agricultural and Life Sciences *WR*	3
ALS 3153 Agricultural Ecology	3
SWS 3022 Introduction to Soils in the Environment *GE-P*	3
Approved elective	3
	Total 12

Semester 6	Credits
AEB 3133 Principles of Agribusiness Management, *3 credits, or* MAN 3025 Principles of Management, *4 credits*	3-4
ENY 3005 Principles of Entomology, *2 credits, and* ENY 3005L Principles of Entomology Laboratory, *1 credit OR* IPM 3022 Fundamentals of Pest Management, *3 credits*	3
SWS 4244 Wetlands	3
Approved elective	3
Elective	3
	Total 15-16

Summer	Credits
SWS 4905 Individual Work *or* SWS 4941 Full-Time Practical Work Experience in Soil and Water Science	3
Approved elective	3
	Total 6

Semester 7	Credits
AOM 4643 Environmental Hydrology	3
FNR 4660 Natural Resource Policy and Economics	3
SWS 4720C GIS in Soil and Water Science	3
Approved elective	3
Elective	3

Total 15

Semester 8	Credits
SWS 4116 Environmental Nutrient Management	3
SWS 4223 Environmental Biogeochemistry	3
Approved electives	6
Total 12	

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Approved Electives

Other electives require advisor approval

Courses	Credits
AEB 3114L Introduction to Agricultural Computer Applications	1
AEB 3144 Introduction to Agricultural Finance	3
AEB 3300 Agricultural and Food Marketing	3
AEB 3341 Selling Strategically	3
AEB 3450 Introduction to Natural Resource and Environmental Economics	3
AEB 3671 Comparative World Agriculture	3
AEB 4123 Agricultural and Natural Resource Law	3
ALS 4161 Exotic Species and Biosecurity Issues	3
ALS 4162 Consequences of Biological Invasions	3
BUL 4310 The Legal Environment of Business	4
ECO 2013 Principles of Macroeconomics	4
ECO 2023 Principles of Microeconomics	4
ENT 3003 Principles of Entrepreneurship	4
ENY 3007C Life Science	3
ENY 3510C Turf and Ornamental Entomology	3
ENY 4210 Insects and Wildlife	3
FOR 3214 Fire in Natural Resource Management	2
FOR 3855 Agroforestry in Southeastern United States	3
FOR 4110 Ecology and Restoration of Longleaf Pine Ecosystems	3
GEB 3373 International Business	4
HOS 3020 Principles of Horticulture Crop Production	3
MAR 3023 Principles of Marketing	4
PLS 3004C Principles of Plant Science	3
SWS 2007 The World of Water	3
SWS 3022L Introduction to Soils in the Environment Laboratory	1
SWS 4207 Sustainable Agricultural and Urban Land Management	3

SWS 4231C Soil, Water and Land Use	3
SWS 4233 Soil and Water Conservation	3
SWS 4245 Water Resource Sustainability	3
SWS 4303C Soil Microbial Ecology	3
SWS 4307 Ecology of Waterborne Pathogens	3
SWS 4451 Soil and Water Chemistry	3
SWS 4550 Soil, Water and Public Health	3
SWS 4602C Soil Physics	3
SWS 4715C Environmental Pedology	4
SWS 4932 Hydric Soils	2
SWS 4932 Forest and Soil Ecosystem Services	3
SWS 4932 Environmental Techniques (2 live labs at selected locations)	3
WIS 2552 Biodiversity Conservation	3
WIS 3401 Wildlife Ecology and Management	3
WIS 4427C Wildlife Habitat Management	3
WIS 4934 Natural Resource Ecology	3

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Related Environmental Management Programs

Deleted: in Agriculture and Natural Resources

- Bachelor of Science in Interdisciplinary Studies: Environmental Management, UF Online

Deleted: in Agriculture and Natural Resources,

On-line

Environmental Management: Interdisciplinary Studies

Deleted: in Agriculture and Natural Resources

This degree program uses an interdisciplinary approach to provide the scientific and technical foundation needed to integrate and communicate the diverse environmental issues associated with urban, agricultural, and natural ecosystems. Students develop an understanding of the best use of our natural resources for their social and economic benefits while protecting associated resource values, property rights and the environment. This degree provides a solid grounding in the areas of hydrology, soil science, pest management, water resources, and agricultural ecology.

About this Major

- **College:** Agricultural and Life Sciences
- **Degree:** Bachelor of Science
- **Credits for Degree:** 120
- **Academic Learning Compact**
- **Additional Information**
- **Contact:** 1.855.99GATOR

- **Related Interdisciplinary Studies: Environmental Management Programs**

Deleted: in Agriculture and Natural Resources

To graduate with this major, students must complete all university, college, and major requirements.

Critical Tracking Model Semester Plan

Overview

This major is for students who desire education in environmental management with substantial emphasis on agriculture and natural resources.

Graduates will find employment with agricultural producers, consulting companies and government agencies that are involved in maintaining a sustainable environment.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites may be used for transfer students.

Semester 1

- Complete 1 of 6 critical-tracking courses, excluding labs: AEC 3030C or SPC 2608, BSC 2005/2005L or BSC 2010/2010L, CHM 2045/2045L, CHM 2046/2046L, MAC 2233, STA 2023
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 2 additional critical-tracking courses, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- 2.0 GPA required for all critical-tracking courses
- Complete 2 additional critical-tracking courses, excluding labs
- 2.0 UF GPA required

Semester 4

- Complete 1 additional critical-tracking course, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete all critical-tracking courses, including labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

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Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold.

Semester 1	Credits

CHM 2045 General Chemistry 1, *3 credits, and* **CHM2045L General Chemistry 1 Laboratory**, *1 credit*	**4**
State Core GE-B or P	
Composition *State Core GE-C; WR*	3
Humanities *State Core GE-H*	3
Social and Behavioral Sciences *State Core GE-S*	3
Elective	2
Total	15

Semester 2	**Credits**
AEB 2014 Economic Issues, Food and You, *3 credits, or* ECO 2013 Principles of Macroeconomics, *4 credits, or* ECO 2023 Principles of Microeconomics, *4 credits* *GE-S*	3-4
CHM 2046 General Chemistry 2, *3 credits, and* **CHM 2046L General Chemistry 2 Laboratory**, *1 credit* *GE-P*	**4**
IUF 1000 What is the Good Life *GE-H*	3
STA 2023 Introduction to Statistics 1 *GE-M*	**3**
Composition *GE-C; WR*	3
Total	16-17

Semester 3	**Credits**
AEC 3030C Effective Oral Communication *or* **SPC 2608 Introduction to Public Speaking**	**3**
BSC 2005 Biological Sciences, *3 credits, and* **BSC 2005L Laboratory in Biological Sciences**, *1 credit* *OR* **BSC 2010 Integrated Principles of Biology 1**, *3 credits, and* **BSC 2010L Integrated Principles of Biology Laboratory 1**, *1 credit* *GE-B*	**4**
GLY 2030C Environmental and Engineering Geology *GE-P*	3
PHY 2020 Principles of Physics or PHY 2004 Applied Physics 1 *GE-P*	3
Elective	3
Total	16

Semester 4	Credits
ALS 3133 Agricultural and Environmental Quality *GE-P*	3
MAC 2233 Survey of Calculus 1 *State Core GE-M*	**3**
Humanities *(GE-H) or* Social and Behavioral Sciences *(GE-S)*	3
Electives	4
	Total 13

Semester 5	Credits
AEC 3033C Research and Business Writing in Agricultural and Life Sciences *WR*	3
ALS 3153 Agricultural Ecology	3
SWS 3022 Introduction to Soils in the Environment *GE-P*	3
Approved elective	3
	Total 12

Semester 6	Credits
AEB 3133 Principles of Agribusiness Management, *3 credits, or* MAN 3025 Principles of Management, *4 credits*	3-4
ENY 3005 Principles of Entomology, *2 credits, and* ENY 3005L Principles of Entomology Laboratory, *1 credit* *OR* IPM 3022 Fundamentals of Pest Management	3
SWS 4244 Wetlands	3
Approved elective	3
Elective	3
	Total 15-16

Summer	Credits
SWS 4905 Individual Work *or* SWS 4941 Full-Time Practical Work Experience in Soil and Water Science	3
Approved elective	3
	Total 6

Semester 7	Credits
AOM 4643 Environmental Hydrology	3
FNR 4660 Natural Resource Policy and Economics	3
SWS 4720C GIS in Soil and Water Science	3
Approved elective	3
Elective	3

	Total 15
Semester 8	**Credits**
SWS 4116 Environmental Nutrient Management	3
SWS 4223 Environmental Biogeochemistry	3
Approved electives	6
	Total 12

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Approved Electives

Other electives require advisor approval

Courses	Credits
AEB 2014 Economics, Food, and You	3
AEB 3671 Comparative World Agriculture	3
ALS 4162 Consequences of Biological Invasions	3
BUL 4310 The Legal Environment of Business	4
ECO 2013 Principles of Macroeconomics	4
ECO 2023 Principles of Microeconomics	4
ENT 3003 Principles of Entrepreneurship	4
ENY 3007C Life Science	3
GEB 3373 International Business	4
MAR 3023 Principles of Marketing	4
SWS 2007 The World of Water	3
SWS 4207 Sustainable Agriculture and Urban Land Management	3
SWS 4233 Soil and Water Conservation	3
SWS 4800 Environmental Soil and Water Monitoring Techniques	3
WIS 4934 Natural Resource Ecology	3

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Related Environmental Management Programs

- Bachelor of Science in Interdisciplinary Studies: Environmental Management

Deleted: in Agriculture and Natural Resources

Deleted: in Agriculture and Natural Resources

(15)

Cover Sheet: Request 11708

Approval of new course: MCB Synthetic Biology

Recycled

Info

Process	Course|New|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Monika Oli moli@ufl.edu
Created	6/15/2017 9:59:59 AM
Updated	8/8/2018 12:29:36 PM
Description of request	Approval of new course: Microbial Applications of Synthetic Biology - MCB 4xxx

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		6/15/2017
No document changes					
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Email sent to submitter with comments.	8/31/2017
No document changes					
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		12/12/2017
Reisch UCC consults.pdf					8/31/2017
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	This request has been recycled by the CALS CC. Needed corrections were sent to the submitter on 1/29/18.	2/7/2018
No document changes					
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		3/9/2018
Reisch MCB4934 syllabus.docx Reisch MCS Synethic Biology Course Differences.docx					3/8/2018 3/8/2018
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Recycled by CALS Curriculum Committee. Comments will be sent to submitter.	5/7/2018
No document changes					
Department	Approved	CALS - Microbiology and Cell Science 514910000	Eric Triplett		8/8/2018
No document changes					
College	Pending	CALS - College of Agricultural and Life Sciences			8/8/2018
No document changes					
University Curriculum Committee					

Step	Status	Group	User	Comment	Updated
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 11708

Info

Request: Approval of new course: MCB Synthetic Biology
Description of request: Approval of new course: Microbial Applications of Synthetic Biology - MCB 4xxx
Submitter: Monika Oli moli@ufl.edu
Created: 6/15/2017 9:59:59 AM
Form version: 1

Responses

Recommended Prefix MCB
Course Level 4
Number xxx
Category of Instruction Joint (Ugrad/Grad)
Lab Code None
Course Title Microbial Applications of Synthetic Biology
Transcript Title Microbe Synthetic Bio
Degree Type Baccalaureate

Delivery Method(s) Online, UF Online - Please attach a letter of support from the Director of the UF Online program
Co-Listing Yes
Co-Listing Explanation There are a few differences between undergraduate and graduate requirements:
Proposals
Each student will be responsible for writing a research proposal that aims to investigate a novel idea in the field of synthetic biology that is of scientific or industrial interest. The proposal for students in the 4xxx level course will be 3 pages single-spaced, while the 6xxx level students are expected to write 6 pages with more detailed experimental approaches.
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description Synthetic biology is the the construction and reconstruction of biological systems, and its practical applications in research and industry. Advanced molecular biology tools for DNA assembly, the construction of biological pathways and circuits, genome editing, and strategies for transcriptional control will be examined in the course.

Prerequisites MCB 3020 or 3023
Co-requisites N/A
Rationale and Placement in Curriculum This course is an important addition to our curriculum, explaining the most current technologies to our students. None of the other course cover the topics discussed in this class.
Course Objectives 1. Define synthetic biology and understand its importance in the 21st century
2. Understand and describe biological parts and their function on the systems level.
3. Understand advanced molecular biology techniques that facilitate the building of biological parts and systems.
4. Consider ethical decisions and containment strategies in synthetic biology

Course Textbook(s) and/or Other Assigned Reading N/A

xxxx
Weekly Schedule of Topics Date (week)
Topic

1
Introduction to Synthetic Biology, Molecular Biology, and Biochemistry

2 - 3
Biological Parts – Promoters, Regulators, Genes, Terminators, Proteins

4
Controlling Gene Expression and Protein Production,

5
Artificial Gene Circuits, Noise in Gene Expression, Test 1

6
BioSensors – Construction and Application

7
Recombinant DNA technologies, Cloning techniques and strategies

8 - 9
Genome Editing - Transposons, Recombinases, Zinc Fingers, TALEN's, CRISPR/Cas9

10
DNA synthesis and Assembly, Test 2

11
Metabolic Engineering – Techniques and Applications,

12
Accelerated Evolution Systems - MAGE, PACE,

13
Synthetic Cells - Recoded E. coli and JCVIsyn1-3.0

14
Containment strategies, Ethical considerations

Links and Policies Class Attendance and Make-Up Policy
Consequences for missing exams and submission deadlines are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.
Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.
Campus Resources
Resources are available on campus for students having personal problems or lacking clear career and academic goals, which interfere with their academic performance. These resources include:

Health and Wellness
- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575;
- Sexual Assault Recovery Services (SARS) at the Student Health Care Center, 392-1161.
- For emergencies call: University Police Department, 392-1111 (or 9-1-1 for emergencies).

http://www.police.ufl.edu/

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
- Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu/
- Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Class demeanor

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

Netiquette guide for online courses

It is important to recognize that the online classroom is in fact a classroom, and certain behaviors are expected when you communicate with both your peers and your instructors. These guidelines for online behavior and interaction are known as netiquette.
http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf

University Honesty Policy

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 (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) 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.

Additional comments regarding academic integrity:

Students are encouraged to discuss material with each other from the course, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following is considered academic dishonesty, and I expect that no student will ever do any of the following:

- Have another person complete a quiz in this course
- Copy another student's quiz in this course
- Collaborate with anyone during a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz window is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
- Use any materials provided by a previous student in the course

Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

Microsoft Office 365 Software is free for UF students
http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/
Other free software is available at:

http://www.software.ufl.edu/
To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357).
University of Florida Complaints Policy and Student Complaint Process
Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructor or the TAs.

The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy.

If a problem really cannot be resolved by communicating with the instructor or the TAs you can contact
- Residential Course:

https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
- Online Course: http://www.distance.ufl.edu/student-complaint-process.

University of Florida Complaints Policy and Student Complaint Process

The University of Florida and most instructors believe strongly in the ability of students to express concerns regarding their experiences at the University. Most problems, questions and concerns about courses can be resolved by professionally communicating with the instructor. Please try to meet your instructor in person, make an appointment to call, or try to set up a remote meeting through Skype or other media.
If this does not help the University encourages the students who wish to file a written complaint to submit that complaint directly to the department that manages that course. If a problem really persists and cannot be resolved by communicating with the instructor and the department chair.
Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
Online Course: http://www.distance.ufl.edu/student-complaint-process

This said, professionalism is a two-way-street. Unprofessional behavior of students includes, among other things: lack of communication, blaming other people or external factors, lying, affecting others negatively in a group or in the class, not accepting criticism and not being proactive in solving problems or seeking help. Furthermore, faculty often have family and other obligations to tend to. Over the weekend, replies to your inquiries or questions maybe delayed.
If a student is lacking professionalism repeatedly, the instructor has the rights to file formal complaint against the student through the Dean of Student office.

Grading Scheme Evaluation of Learning/Grades

3 Exams (100 pts each) –	300 points
Discussion, Quizzes, Homework –	100 points
Written Proposal –	100 points

Exams
There will be 3 exams administered throughout the semester at approximately 5 week intervals. All material covered during class will be subject to testing. Tests are conceptually cumulative because understanding of topics covered early in the course will be required to understand materials covered later in the course.
Discussion, Quizzes, Homework
Throughout the semester there will be quizzes, discussions, and homework assigned for grades that will total 100 points.
Proposals
Each student will be responsible for writing a research proposal that aims to investigate a novel idea in the field of synthetic biology that is of scientific or industrial interest. The proposal for students in the 4xxx level course will be 3 pages single-spaced, while the 6xxx level students are expected to write 6 pages with more detailed experimental approaches. Grading rubrics will be provided in class.
Grading Policy
Final letter grades will be assigned based on the number of points earned, as follows:
A = 470-500 points
A- = 450 – 469 points
B+ = 435 – 449 points
B = 415-434 points
B- = 400-414 points
C+ = 385-399 points

C = 365-384 points
C- = 350-364 points
D+ = 330-349 points
D = 300-329 points
E = 0-299 points
More information on grades and grading policies is here:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Instructor(s) Dr. Christopher Reisch - creisch@ufl.edu

Microbial Applications of Synthetic Biology

MCB 4934, Fall-2018

Instructor

Dr. Christopher Reisch - creisch@ufl.edu

Microbiology and Cell and Science, Office – MCS 1162

Preferred methods for communication with the instructor regarding the course is through email.

Please resolve technical issues by contacting the UF helpdesk (e.g. http://helpdesk.ufl.edu; (352) 392-HELP (4357); *helpdesk*@ufl.edu · HUB 132).

Delivery Method/Meeting time

Online (asynchronous)

Credits

3-Credit hours

Course Description

This course will introduce the concept of synthetic biology, which is loosely defined as the construction and reconstruction of biological systems, and its practical applications in research and industry. Advanced molecular biology tools for DNA assembly, the construction of biological pathways and circuits, genome editing, and strategies for transcriptional control will be examined in the course.

Course Objectives/Goals/Learning Outcomes

Students enrolled in this course will be able to:

1. Define synthetic biology and understand its importance in the 21st century.
2. Understand and describe biological parts and their function on the systems level.
3. Understand advanced molecular biology techniques that facilitate the building of biological parts and systems.

4. Consider ethical decisions and containment strategies in synthetic biology

Prerequisites

MCB 3020 or 3023 with a grade of C or better. An undergraduate course in biochemistry or microbial genetics is also recommended.

Course Material and Assignments

All required course materials will be available through the Canvas e-Learning site (http://elearning.ufl.edu/). Instructions for and submission of assignments will also be through Canvas.

Required Textbooks

There is no required textbook.

Required reading materials will be posted to Canvas.

Weekly Course Schedule

Date (week)	Topic	Readings
1	Introduction to Synthetic Biology, Molecular Biology, and Biochemistry	Foundations for engineering biology Endy, D. (2005). Nature, 438(7067), 449–453. A brief history of synthetic biology Cameron, D. E., Bashor, C. J., & Collins, J. J. (2014). Nature Reviews Microbiology, 12(5), 381–390.
2 - 3	Biological Parts – Promoters, Regulators, Genes, Terminators, Proteins	Design, construction and characterization of a set of insulated bacterial promoters Davis, J. H., Rubin, A. J., & Sauer, R. T. (2011). Nucleic Acids Research, 39(3), 1131–1141. Automated design of synthetic ribosome binding sites to control protein expression http://www.nature.com/nbt/journal/v27/n10/full/nbt.1568.html Salis, H. M., Mirsky, E. A., & Voigt, C. A. (2009). Nature Biotechnology, 27(10), 946–950.
4	Controlling Gene Expression and Protein Production,	Independent and tight regulation of transcriptional units in Escherichia coli via the LacR/O, the TetR/O and AraC/I1-I2 regulatory elements. 1997. R Lutz and H Bujard, Nucleic Acids Res. 25(6): 1203–1210.
5	Artificial Gene Circuits, Noise in Gene Expression,	Construction of a genetic toggle switch in Escherichia coli Collins, J. J., Gardner, T. S., & Cantor, C. R. (2000). Nature, 403(6767), 339–342.

	Test 1	
6	BioSensors – Construction and Application	Synthetic biology devices for in vitro and in vivo diagnostics Slomovic, S., Pardee, K., & Collins, J. J. (2015). PNAS 112(47), 14429–14435. https://doi.org/10.1073/pnas.1508521112
7	Recombinant DNA technologies, Cloning techniques and strategies	Polymerase Chain Reaction https://en.wikipedia.org/wiki/Polymerase_chain_reaction The SLIC, Gibson, CPEC and SLiCE assembly methods (and GeneArt® Seamless, In-Fusion® Cloning) https://j5.jbei.org/j5manual/pages/22.html Enzymatic assembly of DNA molecules up to several hundred kilobases Gibson, D. G., Young, L., Chuang, R.-Y., Venter, J. C., Hutchison, C. A., & Smith, H. O. (2009). Nature Methods, 6(5), 343–345.
8 - 9	Genome Editing - Transposons, Recombinases, Zinc Fingers, TALEN's, CRISPR/Cas9	ZFN, TALEN, and CRISPR/Cas-based methods for genome engineering Gaj, T., Gersbach, C. A., & Barbas, C. F. (2013). ZFN, TALEN, and CRISPR/Cas-based methods for genome engineering. Trends in Biotechnology, 31(7), 397–405.
10	DNA synthesis and Assembly, **Test 2**	Large-scale de novo DNA synthesis: technologies and applications Kosuri, S., & Church, G. M. (2014). Large-scale de novo DNA synthesis: technologies and applications. Nature Methods, 11(5), 499–507.
11	Metabolic Engineering – Techniques and Applications,	Metabolic evolution of energy-conserving pathways for succinate production in Escherichia coli http://www.pnas.org/content/106/48/20180.full Zhang, X., Jantama, K., Moore, J. C., Jarboe, L. R., Shanmugam, K. T., & Ingram, L. O. (2009). PNAS 106(48), 20180–5. Production of the antimalarial drug precursor artemisinic acid in engineered yeast Ro, D.-K., Paradise, E. M., Ouellet, M., Fisher, K. J., Newman, K. L., Ndungu, J. M., ... Keasling, J. D. (2006). Nature, 440(7086), 940–943.
12	Accelerated Evolution Systems - MAGE, PACE,	A system for the continuous directed evolution of biomolecules Esvelt, K. M., Carlson, J. C., & Liu, D. R. (2011). Nature, 472(7344), 499–503.
13	Synthetic Cells - Recoded *E. coli* and JCVIsyn1-3.0	Genomically Recoded Organisms Expand Biological Functions Lajoie, M. J., Rovner, A. J., Goodman, D. B., Aerni, H.-R., Haimovich, A. D., Kuznetsov, G., ... Isaacs, F. J. (2013). Genomically Recoded Organisms Expand Biological Functions. Science, 342(6156), 357–360.

		Design, synthesis, and testing toward a 57-codon genome Ostrov, N., Landon, M., Guell, M., Kuznetsov, G., Teramoto, J., Cervantes, N., ... Church, G. M. (2016). Science, 353(6301), 819–822.
14	Containment strategies, Ethical considerations	Biocontainment of genetically modified organisms by synthetic protein design Mandell, D. J., Lajoie, M. J., Mee, M. T., Takeuchi, R., Kuznetsov, G., Norville, J. E., ... Church, G. M. (2015). Nature, 518(7537)

Exam Dates/Calendar/Critical dates and deadlines

Week 5 - Test 1
Week 6 - Proposal Abstracts Due
Week 9 – Proposal Outline Due
Week 10 – Test 2
Week 14 - Proposal Due
Final – Test 3

Exam Administration - ProctorU

All exams will be administered through ProctorU using Canvas in E-learning with students using personal computers. The exam may be taken at any location approved by ProctorU during previously announced times.
For students to sign up for a ProctorU account go to:
http://www.proctoru.com/forstudents.php

Evaluation of Learning/Grades

3 Exams (100 pts each) –	300 points
Discussion, Quizzes, Homework –	200 points
Written Proposal –	100 points

Exams

There will be 3 exams administered throughout the semester at approximately 5 week intervals. All material covered during class will be subject to testing. Tests are conceptually cumulative because understanding of topics covered early in the course will be required to understand materials covered later in the course.

Exams will be composed of multiple choice, fill in the blank, and essay questions. There will be three essay questions from each module and you will be required to answer one question from each module.

Discussion, Quizzes, Homework

Throughout the semester there will be quizzes, discussions and homework assignments that will total 200 points.

Proposals

Each student will be responsible for writing a research proposal that aims to investigate a novel idea in the field of synthetic biology that is of scientific or industrial interest. The proposal should be 6-8 pages single spaced. A brief rubric of the proposal is provided below.

Introduction (1 page) – Clearly provide relevant background information in the context of research that has previously been performed in synthetic biology and fields related to your topic. At least 5 sources of primary research papers or literature reviews must be cited.

Significance and Novelty (0.5-1 page) – Identify the gap in knowledge that your proposal will address. Explain why this work is important to the field. What are the benefits to science and society that will result from successful completion of this work? Demonstrate that you understand the subject matter and its greater implications. Cite the primary literature and reviews as necessary.

Experimental Plan (1-2 pages) – Describe 1 research aim that will be used to address the gap in knowledge identified above. Provide a logical workflow that will be used to investigate the research question. The purpose of the experiments should be clear, but the exact experimental conditions do not need to be provided.

Grading Policy

Final letter grades will be assigned based on the number of points earned, as follows:
A = 564-600 points
A- = 540 – 563 points
B+ = 516 – 539 points
B = 498-515 points
B- = 480-497 points
C+ = 456-479 points
C = 438-455 points
C- = 420-437 points
D+ = 396-419 points
D = 378-395 points
E = 0-377 points
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- For emergencies call: University Police Department, 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
- Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. http://www.crc.ufl.edu/
- Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

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Additional comments regarding academic integrity:

Students are encouraged to discuss material with each other from the course, help each other understand concepts, study together, and even discuss assessment questions with each other once the quiz window is closed. However, the following is considered academic dishonesty, and I expect that no student will ever do any of the following:

- Have another person complete a quiz in this course
- Copy another student's quiz in this course
- Collaborate with anyone during a quiz in this course
- Discuss the questions and answers of a quiz with other students while the quiz window is still open
- Manipulate and/or distribute any materials provided in this course for any purpose (including course lecture slides).
- Use any materials provided by a previous student in the course

Software Use

All faculty, staff and students of the university are required and expected to obey the 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.

Microsoft Office 365 Software is free for UF students

http://www.it.ufl.edu/gatorcloud/free-office-365-downloads/

Other free software is available at:

http://www.software.ufl.edu/

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357).

University of Florida Complaints Policy and Student Complaint Process

Most problems, questions and concerns about the course will be resolved by professionally communicating with the instructor or the TAs.

The University of Florida believes strongly in the ability of students to express concerns regarding their experiences at the University. The University encourages its students who wish to file a written complaint to submit that complaint directly to the department that manages that policy.

If a problem really cannot be resolved by communicating with the instructor or the TAs you can contact

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- Online Course: http://www.distance.ufl.edu/student-complaint-process.

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If this does not help the University encourages the students who wish to file a written complaint to submit that complaint directly to the department that manages that course. If a problem really persists and cannot be resolved by communicating with the instructor and the department, contact... for
Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
Online Course: http://www.distance.ufl.edu/student-complaint-process

This said, professionalism is a two-way-street. Unprofessional behavior of students includes, among other things: lack of communication, blaming other people or external factors, lying, affecting others negatively in a group or in the class, not accepting criticism and not being proactive in solving problems or seeking help. Furthermore, faculty often have family and other obligations to tend to. Over the weekend, replies to

your inquiries or questions may be delayed.

If a student is lacking professionalism repeatedly, the instructor has the rights to file formal complaint against the student through the Dean of Student office.

Microbial Applications of Synthetic Biology
Differences between 4934 and 6937 level courses

- Exams – There will be three exams composed of multiple choice, fill in the blank, and essay questions that cover two or three modules of the course. There will be three essay questions per module and students in 4963 will only be required to answer one of the three questions per module. Students in MCB6937 will be required to answer all essay questions, requiring a more thorough understanding of the material. Accordingly, the point value of questions will be different for the two courses, with more points derived from the essay questions for the graduate level.

- Proposals - Each student will be responsible for writing a research proposal that aims to investigate a novel idea in the field of synthetic biology that is of scientific or industrial interest. Rubrics for each course are below.

MCB 4934

Introduction (1 page) – Clearly provide relevant background information in the context of research that has previously been performed in synthetic biology and fields related to your topic. At least 5 sources of primary research papers or literature reviews must be cited.

Significance and Novelty (0.5-1 page) – Identify the gap in knowledge that your proposal will address. Explain why this work is important to the field. What are the benefits to science and society that will result from successful completion of this work? Demonstrate that you understand the subject matter and its greater implications. Cite the primary literature and reviews as necessary.

Experimental Plan (1-2 pages) – Describe 1 research aim that will be used to address the gap in knowledge identified above. Provide a logical workflow that will be used to investigate the research question. The purpose of the experiments should be clear, but the exact experimental conditions do not need to be provided.

MCB 6937

Introduction (2 pages) – Clearly provide relevant background information in the context of research that has previously been performed in synthetic biology and fields related to your topic. At least 10 sources of primary literature must be cited (~2 pages).

Significance and Novelty (1-2 pages) – Identify the gap in knowledge that your proposal will address. Explain why this work is important to the field. What are the benefits to science and society that will result from successful completion of this work? Demonstrate that you have a deep understanding of the subject matter and its greater implications. Cite the primary literature and reviews as necessary.

Experimental Plan (3-5 pages) – Provide 3 hypothesis driven research aims that will be used to address the gap in knowledge identified above. Describe a logical workflow that will be used to investigate each aim. The purpose of the experiments should be clear, but the exact experimental conditions do not need to be provided.

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Agricultural and Biological Engineering	Dorota Z. Haman - Professor and Chair
Phone Number	**E-mail**
(352) 392-1864 ext 120	dhaman@ufl.edu

Comments

Please see attached email correspondence. Dr. Haman identified two courses with the potential for minor overlap, but she was happy that the course would be offered at UF.

Department	Name and Title
Molecular Genetics and Microbiology	Henry V. Baker, Professor and Chair
Phone Number	**E-mail**
(352) 273-5935	baker@mgm.ufl.edu

Comments

Dr. Baker saw no potential overlap and believed that the course would complement existing courses in MGM.

Department	Name and Title
Biochemistry and Molecular Biology	James Flanegan, Professor and Chair
Phone Number	**E-mail**
(352) 294-8384	flanegan@ufl.edu

Comments

See attached correspondence. Dr. Flanegan and Dr. Tom Yang found a "relatively small amount of overlap" with courses in BMB, though the overlap is not a concern to the department.

UF UNIVERSITY of FLORIDA

UCC: External Consultations

External Consultation Results (departments with potential overlap or interest in proposed course, if any)

Department	Name and Title
Biology	Prof. Marta Wayne
Phone Number	**E-mail**
352-392-9925	mlwayne@ufl.edu

Comments

The Department of Biology is also offering a course on synthetic biology taught by Dr. Ed Braun. Dr. Braun and I have been in contact and aim to make the two courses complementary and not competing. See the attached correspondance for details on the the specifics of each course.

Department	Name and Title
Phone Number	**E-mail**

Comments

Department	Name and Title
Phone Number	**E-mail**

Comments

Re: External Consult for MCS course

Pullammanappallil,Pratap C

Wed 3/1/2017 6:36 PM

To:Haman,Dorota Zofia <dhaman@ufl.edu>; Chris Reisch <creisch@ufl.edu>;

Hi Chris
The Applied Microbiology and Biotechnology covers industrial fermentation and wastewater treatment applications of biotechnology. The focus is on the process engineering aspects along with mathematical modeling of processes. So I do not see any overlap with your proposed course.
I will be recommending your Synthetic Biology course to my graduate students.

Best Regards
Pratap

From: Dorota Haman <dhaman@ufl.edu>
Date: Wednesday, March 1, 2017 at 12:35 PM
To: Chris Reisch <creisch@ufl.edu>
Cc: "Correll,Melanie J" <correllm@ad.ufl.edu>, Pratap Pullammanappallil <pcpratap@ufl.edu>
Subject: Re: External Consult for MCS course

Chris,
Pratap Pullammanappallil is teaching ABE4600 and as far as I know, he does not teach synthetic biology in it. I have copied him on this email. Melanie Correll is also very interested in your class – she talked about synthetic biology in her class and works with a team of students on synthetic biology competition – I also copied her on this email. These are two faculty members that you may want to talk to. I am glad to see this class being developed at UF.
Dorota

Dr. Dorota Z. Haman
Professor and Chair
Agricultural and Biological Engineering
120 Rogers Hall
PO Box 110570
University of Florida
Gainesville FL 32611-0570

Tel: (352) 392-1864 ext 120
Fax: (352) 392-4092
email:dhaman@ufl.edu
http://abe.ufl.edu/

From: Chris Reisch <creisch@ufl.edu>
Date: Wednesday, March 1, 2017 at 10:18 AM
To: Dorota Haman <dhaman@ufl.edu>
Subject: External Consult for MCS course

Hi Dr. Haman,

I'm developing a 4000/6000 level course in synthetic biology that will be listed in Microbiology and Cell Sciences and need to get external consultations for potential course overlap. The course will focus on techniques and microbial applications of synthetic biology, including; methods for transcriptional and transnational control of gene expression, genome evolution and editing, metabolic engineering, and synthetic cell creation. I was specifically concerned about overlap with ABE4600 - Applied Microbial Biotechnology. Is the course still being taught and is there a faculty member that I should contact for consultation? I've attached a draft of the syllabus for your reference.

Best,
Chris

Christopher R. Reisch
Assistant Professor
Department of Microbiology and Cell Science
1355 Museum Road, Room 1146
University of Florida

FW: External Consult for MCS course

Flanegan,James B

Thu 3/23/2017 12:04 PM

To:Chris Reisch <creisch@ufl.edu>;

Cc:Yang,Thomas P <tpyang@ufl.edu>; Triplett,Eric <ewt@ufl.edu>;

Dear Chris,

I asked Dr. Tom Yang to look at your new course for potential overlap with courses in our department. I agree with Dr. Yang's assessment that the relatively small amount of overlap with our courses is not a concern to our department. Let me know if you have any additional questions.

Bert

James B. Flanegan, Ph.D.
Professor and Chair
Department of Biochemistry & Molecular Biology
College of Medicine
University of Florida
flanegan@ufl.edu
(352) 294-8384 (office)

From: Yang,Thomas P
Sent: Wednesday, March 22, 2017 8:55 AM
To: Flanegan,James B <flanegan@UFL.EDU>
Subject: Re: External Consult for MCS course

Bert
There appears to be a bit of overlap in course content but nothing that really concerns me. The emphasis of this new course is so different than ours that it really appears to be a different course.
Tom

On Mar 21, 2017, at 5:45 PM, "Flanegan,James B" <flanegan@UFL.EDU> wrote:

> Tom,
>
> Please look at this and let me know if you think that there is potential overlap with BCH 6415 or BCH 5413. If there is overlap, is it significant enough for us to be "concerned" about it.
>
> Thanks,
>
> Bert

From: Chris Reisch
Sent: Monday, March 20, 2017 1:18 PM
To: Flanegan,James B <flanegan@UFL.EDU>
Subject: External Consult for MCS course

Hi James,

I'm developing a 4000/6000 level course in synthetic biology that will be listed in Microbiology and Cell Sciences and I need to get external consultations for potential course overlap from Department Chairs. The course will focus on techniques and prokaryotic applications of synthetic biology, including; methods for transcriptional and translational control of gene expression, genome evolution and editing, metabolic engineering, and synthetic cell creation. I think there will be minor overlap with BCH 6415 - Advanced Molecular and Cell Biology. I've attached a draft of the syllabus for your reference. Please let me know if you have concern about overlap with this, or any other course offered in BCH.

Best,
Chris

Christopher R. Reisch
Assistant Professor
Department of Microbiology and Cell Science
1355 Museum Road, Room 1152
University of Florida

<Reisch UF synbio syllabus -1.docx>

RE: External consult for MCS course

Baker,Henry V

Tue 3/28/2017 10:53 AM

To:Chris Reisch <creisch@ufl.edu>;

Dear Dr. Reisch,

Thank you for giving me the opportunity to review your proposed syllabus. From the perspective of the department of molecular genetics and microbiology we do not see a potential conflict with your proposed course and the courses we offer. In fact we believe that your course is complementary to some of our offerings and we wish you luck with getting it launched.

Kindest regards,

Henry V. Baker, Ph.D.
Hazel Kitzman Professor of Genetics
Professor of Surgery
Chair, Dept. Molecular Genetics and Microbiology
University of Florida College of Medicine
Associate Director University of Florida Genetics Institute

From: Chris Reisch
Sent: Tuesday, March 28, 2017 10:45 AM
To: Baker,Henry V <hvbaker@UFL.EDU>
Subject: External consult for MCS course

Dear Dr. Baker,

I'm developing a 4000/6000 level course in synthetic biology that will be listed in Microbiology and Cell Sciences and I need to get external consultations for potential course overlap from Department Chairs. The course will focus on techniques and prokaryotic applications of synthetic biology, including; methods for transcriptional and translational control of gene expression, genome evolution and editing, metabolic engineering, and synthetic cell creation. I have attached a draft of the syllabus for your reference. Please let me know if you have concern about overlap with any course in MBM.

Best,
Chris

Christopher R. Reisch
Assistant Professor
Department of Microbiology and Cell Science
1355 Museum Road, Room 1152
University of Florida

Re: external consult for MCB

Wayne,Marta L

Fri 8/18/2017 10:38 AM

To:Chris Reisch <creisch@ufl.edu>;

Cc:Braun,Edward Louis <ebraun68@ufl.edu>;

Dear Chris,

Many thanks! I am really pleased that you and Ed are working together to make complementary courses. I would like to see the two proposals go forward together so that they appear at UCC simultaneously and consults are signed off by Micro and Bio simultaneously as well, so I am cc'ing Ed here and asking him to move forward getting a proposal together. Ed, I think that Tangelyn would be happy to help you if you will just provide her with a syllabus.

Cheers,
Marta

=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=

Marta L. Wayne, Ph. D.
Professor and Chair
P.O. Box 118525
Department of Biology
University of Florida
Gainesville, FL 32611-8525
(courier: 876 Newell Drive)
vox: 352-392-9925
fax: 352-392-3704
http://people.biology.ufl.edu/mlwayne/

On Aug 17, 2017, at 5:09 PM, Chris Reisch <creisch@ufl.edu> wrote:

Hi Dr. Wayne,

I'm teaching a course in synthetic biology in the department of microbiology and cell science and need to get an external consult from Biology. Ed Braun and I have communicated and plan on making our two courses complimentary, not competing. Below is a brief explanation of the two courses and how they will be different. I've also attached a draft of my syllabus. Hopefully this is satisfactory, let me know what you think.

The proposed course "Microbial Applications of Synthetic Biology," currently being offered by Dr. Christopher Reisch as MCB 4934, will not overlap in any significant way with another course in the same general field that I am developing in the Department of Biology. The Microbiology and Cell Science course and the Biology course have distinct foci, formats, and target audiences. Specifically, the course proposed by Dr. Reisch is heavily focused on methods used in synthetic biology in microbiology and it is an online course. In contrast, the Biology course is focused on conceptual issues associated with the use of synthetic biology to understand minimal genomes and it will be a face-to-face course with student projects.
Dr. Reisch and I have discussed our courses and both of us feel that we will not be competing for students. Given these clear delineation between the courses students that would like to focus on the details of methodology will be best served by Dr. Reisch's course whereas those focused on

understanding issues of building minimal genomes will be best served by my course. Obviously, there may be some students that will wish to take both courses. However, the differences between our courses mean that students will have complementary experiences.

Best,
Chris

Christopher R. Reisch
Assistant Professor
Department of Microbiology and Cell Science
1355 Museum Road, Room 1152
University of Florida
<Reisch UF synbio syllabus 4.docx>

Cover Sheet: Request 12481

HOS3XXX – Medicinal Plant and Herb Production

Info

Process	Course|New|Ugrad/Pro
Status	Pending at CALS - College of Agricultural and Life Sciences
Submitter	Gerardo Nunez Villegas g.nunez@ufl.edu
Created	4/3/2018 6:32:01 PM
Updated	8/10/2018 4:09:45 PM
Description of request	We request to create a new undergraduate course titled "Medicinal Plant and Herb Production"

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	CALS - Horticultural Sciences 514923000	Kevin Folta		4/3/2018
No document changes					
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Recycled by the CALS Curriculum Committee Comments will be sent to the submitter.	5/7/2018
No document changes					
Department	Approved	CALS - Horticultural Sciences 514923000	Kevin Folta		5/7/2018
No document changes					
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Approved by department prior to edits being made.	5/7/2018
No document changes					
Department	Approved	CALS - Horticultural Sciences 514923000	Kevin Folta		5/7/2018
No document changes					
College	Recycled	CALS - College of Agricultural and Life Sciences	Joel H Brendemuhl	Recycled again until edits can be made.	5/7/2018
No document changes					
Department	Approved	CALS - Horticultural Sciences 514923000	Kevin Folta		8/10/2018
Syllabus HOS3XXX - Breeding and Production of Medicinal Plants and Herbs_CALS CC Submission.pdf					8/10/2018
CALS-Bio Chair - Outside consult.pdf					8/10/2018
S. Percival - Outside consult - FSHN.pdf					8/10/2018
K. Kenworthy - Outisde consult - Agronomy.pdf					8/10/2018
D. Kopsell - Outside consult - Environmental Horticulture.pdf					8/10/2018
Support letter- HOS3XXX Breedng and Production of Medicinal Plants and Herbs - Final.pdf					

Step	Status	Group	User	Comment	Updated
College	Pending	CALS - College of Agricultural and Life Sciences			8/10/2018
No document changes					
University Curriculum Committee					
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 12481

Info

Request: HOS3XXX – Medicinal Plant and Herb Production
Description of request: We request to create a new undergraduate course titled "Medicinal Plant and Herb Production"
Submitter: Gerardo Nunez Villegas g.nunez@ufl.edu
Created: 8/10/2018 3:05:52 PM
Form version: 3

Responses

Recommended Prefix HOS
Course Level 3
Number XXX
Category of Instruction Intermediate
Lab Code None
Course Title Breeding and Production of Medicinal Plants and Herbs
Transcript Title Breed Prod Medicinal
Degree Type Baccalaureate

Delivery Method(s) On-Campus
Co-Listing No
Co-Listing Explanation N/A
Effective Term Earliest Available
Effective Year Earliest Available
Rotating Topic? No
Repeatable Credit? No

Amount of Credit 3

S/U Only? No
Contact Type Regularly Scheduled
Weekly Contact Hours 3
Course Description Medicinal plants are a rapidly-growing niche in horticulture. This course focuses on current and emerging breeding and cultivation practices used to produce high–value medicinal plants and herbs. Additionally, this course provides a critical analysis of health effects and therapeutic claims of plant-derived physiologically-active products.
Prerequisites AGR 3303 or equivalent
Co-requisites None
Rationale and Placement in Curriculum Our undergraduate program currently offers several commodity-specific breeding and production courses We do not currently offer a course focused on medicinal plants and herbs; nor is there any such course taught at UF. We believe our course offerings could be enhanced by adding a breeding and production of medicinal plants and herbs course, as this is a rapidly-growing niche in horticulture.
Course Objectives Upon successful completion of this course, students will be able to:

- Discuss botany, economics, and regulation of medicinal plants and herbs
- Explain breeding strategies for manipulation of secondary metabolites
- Compare anecdotal and traditional medicine claims of efficacy against scientific literature
- Explain in general terms how hydroponic systems, soilless media, supplemental lighting, and CO2 enrichment operate
- Discuss how physiological stress factors can be used to optimize secondary metabolite production
- Appraise the importance of the medicinal plant niche in horticulture

Course Textbook(s) and/or Other Assigned Reading • Wicked plants: The Weed that Killed Lincoln's Mother and Other Botanical Atrocities, Amy Stewart, 2009, 1st edition. ISBN 978-1565126831
• Ball Redbook Volume 2, Jim Nau (Ed) 2011, 18th Edition. ISBN 978-1-883052-68-3

Weekly Schedule of Topics Week 1. Botany and uses of medicinal plants
Week 2. Economically important herbs
Week 3.Functional foods and nutraceutical regulations under the FDA certified organic production and other labels
Week 4: Germplasm collection and evaluation: From wild plant to cash crop
Week 5. Breeding "orphan" crops: modern plant breeding in crops with limited genetic and genomic resources
Week 6-7: Breeding for therapeutic compounds: anti-inflammatories, anti-microbials, antioxidants, psychoactives
Week 8. Breeding to reduce toxic compounds
Week 9. Discussion: Wicked Plants
Week 10. Cloning and propagation of medicinal plants and herbs
Week 11. Open field, hydroponic systems, and soilless cultivation
Week 12. Supplemental lighting and photomorphogenic responses
Week 13. Temperature control and CO2 enrichment
Week 14. Harvest and postharvest for fresh market production
Week 15. Harvest and postharvest for processed production
Links and Policies Attendance and Make-up Work: Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Online Course Evaluation Process: Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at www.evaluations.ufl.edu
Evaluations are typically open during the last two or three weeks of the semester. Students will be notified of the specific times when evaluations for this course are open. Summary results of these assessments are available to students at: www.evaluations.ufl.edu/results

Academic Honesty
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."
It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code

Software Use
All faculty, staff and students of the university are required and expected to obey the 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 when appropriate.
Services for Students with Disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.
- Disability Resource Center, 0001 Reid Hall, (352) 392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are

encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling and Wellness Center, 3190 Radio Road, 392-1575, www.counseling.ufl.edu

Counseling Services
Groups and Workshops
Outreach and Consultation
Self-Help Library
Wellness Coaching

- U Matter We Care, www.umatter.ufl.edu
- Career Resource Center, CR-100 Reitz Union, 392-1601, www.crc.ufl.edu/next-level

Student Complaints

- Residential Courses: www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
- Online Course: www.distance.ufl.edu/student-complaint-process

Grading Scheme Weekly quizzes (30 points)
Quizzes (2 pts each) will be available on Canvas every Friday. Students can use notes, websites, and textbooks as reference materials, but they must work individually.
Therapeutic claims project (20 points)
Traditional medicine and anecdotal descriptions about the health benefits of plant-derived compounds are abundant. However, these claims are rarely backed up by scientific evidence. The goal of this assignment is to compare and contrast an anecdotal or traditional medicine claim with findings from peer-reviewed literature.
For this assignment, students will identify and explain a therapeutic claim. A minimum of six sources with information about the selected therapeutic claim will be identified. Three of these sources must reflect anecdotal or traditional medicine claims and the other three sources must be peer-reviewed scientific publications. Students will write a 1,000-word blog post where the health effects and therapeutic claims of plant derived physiologically-active products will be critically analyzed. This blog post can be hosted in any blogging site (wordpress.com, blogger.com, etc.).
Additional details about this project will be provided in class.
Breeding strategy project (30 points)
Herbs and medicinal plants are largely understudied horticultural commodities. Thus, adaptation of strategies from other horticultural crops is necessary for successful breeding and cultivation of high-value medicinal plants and herbs. In this assignment, students will identify a breeding strategy currently used in a well-studied horticultural greenhouse crop (e.g.. tomato, cucumber, pepper) and propose its application to a medicinal plant or herb. The proposal will consist of a short literature review (500 words, 8 points), a breeding strategy rationale (1000 words, 14 points), and a written plan for implementation (500 words, 8 points). Additional details and a grading rubric will be provided in class.
Exams (20 points)
There will be a mid-term and final exam, each worth 10 points. The final will be given during exam week. Exams will include questions requiring long and short answers. A sample exam will be provided to aid in studying for the midterm and final exams.

Instructor(s) To be determined

From:	Darnell,Rebecca L
To:	Nunez, Gerardo; Chase,Christine D
Subject:	Fwd: Proposed HOS course in Medicinal Plants
Date:	Monday, July 30, 2018 5:33:21 PM
Attachments:	Syllabus HOS3XXX - Breeding and Production of Medicinal Plants and Herbs,...docx ATT00001.htm

Still waiting to hear from EH and Agr!

Begin forwarded message:

From: ". CLAS-Biology Chair" <chair@biology.ufl.edu>
Date: July 30, 2018 at 12:12:42 PM MDT
To: "Darnell,Rebecca L" <rld@ufl.edu>
Cc: "Mutahi,Teresa" <tmutahi@ufl.edu>, "Davis, Ellen Christine" <christine.davis@ufl.edu>, "Douglas,Norman A" <nadouglas@ufl.edu>, "Sessa, Emily" <emilysessa@ufl.edu>, "Gerlach, Nicole" <ngerlach@ufl.edu>
Subject: Proposed HOS course in Medicinal Plants

Dear Rebecca,

A quick note to let you know we have finally gotten feedback from everyone in the department who might teach a course overlapping with yours, letting you know that the amount of overlap with your syllabus is minimal.

Thanks for consulting us!
Marta

From:	Kopsell,Dean A
To:	Darnell,Rebecca L
Cc:	Kruse, Jason K; Nunez, Gerardo; Chase,Christine D; Boyle,Dee
Subject:	RE: Proposed HOS course in Medicinal Plants
Date:	Wednesday, August 08, 2018 10:55:31 AM

Rebecca,

I've consulted with many of our faculty and as a department, we cannot support your course proposal at this time.

We have over a half dozen individual teaching/research/extension programs in the department with a focus on medicinal and herbal crop production and/or breeding. We have recently submitted a new position proposal to CALS for the next round of the Provost's hiring initiative in the exact areas covered in your course outline (see below). Lastly, the current medicinal crop industry within the state has already aligned themselves with the Florida Nursery Growers and Landscape Association (FNGLA) – one of our main commodity groups.

We feel that your proposal is infringing on our expertise as a department, so we cannot support the course being offered through Horticultural Sciences.

Best,
Dean Kopsell

Dean A. Kopsell, *Professor and Chair*
Environmental Horticulture Department | University of Florida
1545 Fifield Hall | PO Box 110670 | Gainesville, FL 32611-0670
Direct: (352) 294-3059 | Main Office: (352) 392-1831 | Office Fax: (352) 392-3870
Email: dean.kopsell@ufl.edu

UF IFAS
UNIVERSITY of FLORIDA

ENVIRONMENTAL HORTICULTURE

Position Proposal from ENH submitted on July 24, 2018:

***Assistant Professor*, Medicinal and Therapeutic Plants, Environmental Horticulture Department**

9-month; 50% Teaching/50% Research

Many pharmaceutical drugs and supplements originate from plant secondary metabolite compounds. There is also renewed interest in the human health values associated with

specialty edible crops. The increased interest in medicinal plants and trends in healthy food choices have created great demand for qualified technical personnel in the management of highly specialized crop production systems. This proposed position would complement the expanding expertise in medicinal plants and phytonutrients within the Environment Horticulture Department (currently 6 different programs). These areas also interact with natural products chemistry, which involves the identification, isolation, and purification of plant-based compounds with beneficial contributions to the field of medicine. The position would allow collaborations with the College of Medicine (COM), such as the Department of Pharmacology and Therapeutics. Increased instructional/research capacity would also benefit the Doctor of Plant Medicine (DPM) program within IFAS, and the developing Horticultural Therapy program which is a collaborative effort between the ENH department and COM.

Potential Courses:

- Herbs, Spices, and Medicinal Plants *
- Exploration/Identification of Medicinal Plants *
- Production techniques to maximize plant medicinal and therapeutic compounds
- Phytochemical/Phytonutrient in Specialty Crops

** possible UF general education course to help recruit undecided students into the Plant Science major.*

From: Darnell,Rebecca L
Sent: Wednesday, August 08, 2018 9:16 AM
To: Kopsell,Dean A <dean.kopsell@ufl.edu>
Cc: Kruse, Jason K <jkk@ufl.edu>; Nunez, Gerardo <g.nunez@ufl.edu>; Chase,Christine D <cdchase@ufl.edu>
Subject: Re: Proposed HOS course in Medicinal Plants

Hi Dean

Can you send any comments about this proposed course to Gerardo with cc to Chris and me by today so we can meet the CALS deadline?

Thanks
Rebecca

On Jul 25, 2018, at 9:28 AM, Darnell,Rebecca L <rld@ufl.edu> wrote:

Thanks Dean. I will be out of contact for much of the next two weeks, so I've added Gerardo to this email thread. If you can respond to both of us that would be good.

Thanks
Rebecca

On Jul 25, 2018, at 10:08 AM, Kopsell,Dean A <dean.kopsell@ufl.edu> wrote:

> Rebecca,
>
> Thank you for reaching out to us. I'll get with Jason soon to discuss your course proposal.
>
> We should be able to return comments to you before the deadline of the 8th.
>
> Best,
> Dean
>
> Dean A. Kopsell, *Professor and Chair*
> Environmental Horticulture Department | University of Florida
> 1545 Fifield Hall | PO Box 110670 | Gainesville, FL 32611-0670
> Direct: (352) 294-3059 | Main Office: (352) 392-1831 | Office Fax: (352) 392-3870
> Email: dean.kopsell@ufl.edu
>
> **From:** Darnell,Rebecca L
> **Sent:** Tuesday, July 24, 2018 4:48 PM
> **To:** Kopsell,Dean A <dean.kopsell@ufl.edu>; Kruse, Jason K <jkk@ufl.edu>
> **Subject:** RE: Proposed HOS course in Medicinal Plants
>
> Hi Dean and Jason,
>
> I just found out that the deadline to get the course returned to the CALS curriculum committee is Aug. 8. It was submitted initially at the April 13, 2018 CALS meeting, at which time the committee asked us to get approval from several departments. If possible, can we hear back from you prior to that deadline?
>
> Thanks!
> Rebecca

From: Darnell,Rebecca L
Sent: Monday, July 23, 2018 11:48 AM
To: Kopsell,Dean A <dean.kopsell@ufl.edu>; Kruse, Jason K <jkk@ufl.edu>
Subject: Proposed HOS course in Medicinal Plants

Dear Dean and Jason,

Our department is proposing a new undergraduate course in "Breeding and Production of Medicinal Plants and Herbs". We are reaching out to you to ensure there is minimal overlap between what we propose and any courses you currently offer at the undergraduate level. If agreeable to you, we would need an email to confirm your approval. I've attached the proposed syllabus. Please let me know if there are any concerns and/or comments. We would appreciate your response by August 13 so we can make any edits that are required. Feel free to contact me if there are questions.

Thank you.

Regards,
Rebecca

Rebecca Darnell
Professor & Associate Chair
Horticultural Sciences Dept.
University of Florida
Gainesville, FL 32611

From:	Kenworthy, Kevin E
To:	Darnell,Rebecca L
Cc:	Macdonald,Gregory E; Gilbert,Robert A; Babar,Md Ali; Rios,Esteban F; Altpeter,Fredy; Nunez, Gerardo; Chase,Christine D
Subject:	RE: Proposed HOS courses in Medicinal Plants and Fruit Breeding
Date:	Wednesday, August 08, 2018 1:23:43 PM
Attachments:	Syllabus HOS3XXX - Breeding and Production of Medicinal Plants and Herbs....docx Syllabus HOS3XXX - Genetics and Breeding of Fruit Crops.docx

Hi Rebecca,

I just got the syllabi yesterday and am using this email to convey my thoughts at this point.

First, I think that Rob and Ali need to review the syllabi and compare with our plant breeding course (AGR 4320) to determine the overlap and potential impact.

You are requiring AGR3303 as a prerequisite, but what about the Agronomy plant breeding course. If the intention is to replace AGR 4320, how many students do you anticipate taking your courses? We would need to know the impact on AGR 4320.

Right now, I am not too concerned about the medicinal plants course; but I am concerned about the fruit crops course and it directly competing with AGR 4320. At least half of the course is an overlap with AGR 4320. Does Mike Kane teach a micropropagation course? Some of this material might overlap; therefore, he and EH should review.

At a broader level, I am concerned about offering such specialized breeding courses for undergrads. It seems that specialized courses like these will devalue our graduate courses and graduate degrees. Does HS still teach the Breeding Perennial Crops graduate course? The fruit course appears to be an undergraduate version of this Perennial Breeding course formerly taught by Paul Lyrene (not sure if Olmstead taught the course). I will bring this up at next week's Plant Breeders Working Group meeting. I would support both courses at the graduate level.

Perhaps a better approach would be for folks in HS to meet with Ali and provide him some fruit crop examples/case studies so that these can be integrated into AGR 4320. Ali's class is probably heavy on agronomic crops, but could easily be tweaked to include other examples. Breeding methods are often similar. My turf breeding program is essentially the same as the blueberry program.

I could see a very useful course that could be developed that includes the other aspects of these two courses regarding the chemistry of medicinal plants and flavor in fruit crops. The incorporation of these traits in a breeding program could be a nice graduate course without having to include the breeding methods that would be taught in AGR 4320.

Thank you for giving us an opportunity to review the proposed courses.

Kevin

Kevin Kenworthy, Ph.D.
Professor, Plant Breeding
UF/IFAS Agronomy Department
2005 SW 23rd St
P.O. Box 110965
Gainesville, FL 32611

Cell: 352-262-8719
Email: kenworth@ufl.edu

-----Original Message-----
From: Darnell,Rebecca L
Sent: Wednesday, August 8, 2018 9:23 AM
To: Kenworthy, Kevin E
Cc: Macdonald,Gregory E; Gilbert,Robert A; Babar,Md Ali; Rios,Esteban F; Altpeter,Fredy; Nunez, Gerardo; Chase,Christine D
Subject: Re: Proposed HOS courses in Medicinal Plants and Fruit Breeding

Hi Kevin

Have you and the other breeding faculty had a chance to look over the two proposed syllabi we sent? We'd like to incorporate any suggestions you have.

Thanks
Rebecca

> On Aug 4, 2018, at 3:50 PM, Darnell,Rebecca L <rld@ufl.edu> wrote:
>
> Hi Kevin
>
> I'm in Glacier right now. I sent Greg and Rob the syllabi with the original email. Can one of them forward that to you?
>
> Thanks
> Rebecca
>
>> On Aug 2, 2018, at 8:50 AM, Kenworthy, Kevin E <kenworth@ufl.edu> wrote:
>>
>> Hi Rebecca,
>>
>> Sorry for my slow response. I am not back in the office.
>>
>> I will need the syllabi for the two proposed courses. I have copied other main campus Agronomy breeders so that they can also provide their input to me which I will then summarize for you. Please reply all with the syllabi attached. I see that you are out of the office so perhaps Greg can forward them to the group.
>>
>> Thank You,
>>
>> Kevin
>>
>> Kevin Kenworthy, Ph.D.
>> Professor, Plant Breeding
>> UF/IFAS Agronomy Department
>> 2005 SW 23rd St
>> P.O. Box 110965
>> Gainesville, FL 32611
>>
>> Cell: 352-262-8719
>> Email: kenworth@ufl.edu
>>
>>
>> -----Original Message-----
>> From: Darnell,Rebecca L
>> Sent: Wednesday, July 25, 2018 1:01 PM
>> To: Macdonald,Gregory E; Gilbert,Robert A
>> Cc: Kenworthy, Kevin E
>> Subject: RE: Proposed HOS courses in Medicinal Plants and Fruit Breeding

>>
>> Thanks, Greg. I'll wait to hear back from Kevin.
>>
>> _____
>> From: Macdonald,Gregory E
>> Sent: Wednesday, July 25, 2018 12:57 PM
>> To: Darnell,Rebecca L; Gilbert,Robert A
>> Cc: Kenworthy, Kevin E
>> Subject: RE: Proposed HOS courses in Medicinal Plants and Fruit Breeding
>>
>> I don't' have an issue with either course, but I would need Kevin's input to make sure there isn't overlap with our plant breeding course, or other courses.
>>
>> Greg
>>
>>
>>
>> Greg MacDonald
>> Professor of Weed Science and Agronomy
>> 2059 McCarty Hall, P.O. Box 110500
>> University of Florida
>> Gainesville, FL 32611-0500
>> Office - (352) 294-1594
>> Cell - (352) 262-8393
>> Email - pineacre@ufl.edu
>>
>> From: Darnell,Rebecca L
>> Sent: Tuesday, July 24, 2018 4:45 PM
>> To: Macdonald,Gregory E <pineacre@ufl.edu>; Gilbert,Robert A <ragilber@ufl.edu>
>> Cc: Kenworthy, Kevin E <kenworth@ufl.edu>
>> Subject: RE: Proposed HOS courses in Medicinal Plants and Fruit Breeding
>>
>> Thanks, Greg. I just found out that the deadline to get the first course returned to the CALS curriculum committee is Aug. 8. It was submitted initially at the April 13, 2018 CALS meeting, at which time the committee asked us to get approval from several departments. If possible, can we hear back from you prior to that deadline?
>>
>> Thanks!
>> Rebecca
>>
>> From: Macdonald,Gregory E
>> Sent: Monday, July 23, 2018 4:37 PM
>> To: Darnell,Rebecca L <rld@ufl.edu<mailto:rld@ufl.edu>>; Gilbert,Robert A <ragilber@ufl.edu<mailto:ragilber@ufl.edu>>
>> Cc: Kenworthy, Kevin E <kenworth@ufl.edu<mailto:kenworth@ufl.edu>>
>> Subject: RE: Proposed HOS courses in Medicinal Plants and Fruit Breeding
>>
>> I copied Kevin Kenworthy who works closely with the undergraduate plant breeding majors to gather his input on these courses.
>>
>> Greg
>>
>> From: Darnell,Rebecca L
>> Sent: Monday, July 23, 2018 11:55 AM
>> To: Macdonald,Gregory E; Gilbert,Robert A
>> Subject: Proposed HOS courses in Medicinal Plants and Fruit Breeding
>>
>> Dear Greg and Rob,

>>
>> Our department is proposing two new undergraduate courses: "Breeding and Production of Medicinal Plants and Herbs" and "Genetics and Breeding of Fruit Crops". We are reaching out to you to ensure there is minimal overlap between what we propose and any courses you currently offer at the undergraduate level. We propose that both courses have AGR 3303 as a prerequisite. If our proposed courses are agreeable to you, we would need an email to confirm your approval. I've attached the proposed syllabus. Please let me know if there are any concerns and/or comments. We would appreciate your response by August 13 so we can make any edits that are required. Feel free to contact me if there are questions.
>>
>> Thank you.
>>
>> Regards,
>> Rebecca
>>
>> Rebecca Darnell
>> Professor & Associate Chair
>> Horticultural Sciences Dept.
>> University of Florida
>> Gainesville, FL 32611
>>

From: Darnell,Rebecca L
To: Nunez, Gerardo
Subject: Fwd: Proposed HOS course in Medicinal Plants
Date: Tuesday, August 07, 2018 1:24:14 PM

Here is the response from Sue Percival, FSHN Chair.

Begin forwarded message:

From: Percival,Susan S
Sent: Monday, July 23, 2018 12:41 PM
To: Darnell,Rebecca L <rld@ufl.edu>; von Castel,Kristina <kristina.voncast@ufl.edu>
Subject: RE: Proposed HOS course in Medicinal Plants

There is no overlap with our courses. The closest thing we have to this is our graduate course on nutraceuticals that Dr. Gu teaches.

From: Darnell,Rebecca L
Sent: Monday, July 23, 2018 11:47 AM
To: von Castel,Kristina <kristina.voncast@ufl.edu>; Percival,Susan S <percival@ufl.edu>
Subject: Proposed HOS course in Medicinal Plants

Dear Kristina and Sue,

Our department is proposing a new undergraduate course in "Breeding and Production of Medicinal Plants and Herbs". We are reaching out to you to ensure there is minimal overlap between what we propose and any courses you currently offer at the undergraduate level. If agreeable to you, we would need an email to confirm your approval. I've attached the proposed syllabus. Please let me know if there are any concerns and/or comments. We would appreciate your response by August 13 so we can make any edits that are required. Feel free to contact me if there are questions.

Thank you.

Regards,

Rebecca Darnell
Professor & Associate Chair
Horticultural Sciences Dept.
University of Florida
Gainesville, FL 32611

UF | UNIVERSITY of FLORIDA

University of Florida Institute of Food and Agricultural Science
Horticultural Sciences Department
August 9, 2018

1251 Fifield Hall
PO Box 110690
Gainesville, FL 32611
352-392-1928

CALS Curriculum Committee

Dear colleagues in the CALS curriculum committee,

I write this letter in support of our new course request for HOS 3XXX – Breeding and Production of Medicinal Plants and Herbs (originally submitted during the April 2018 meeting). This course leverages our department's expertise in breeding and production of high-value horticultural commodities. Additionally, this course builds upon our current course offerings focused on herbs and phytochemicals. Biology (Botany), Agronomy, and Food Science & Human Nutrition have provided favorable outside consults.

In response to concerns raised by the Environmental Horticulture Department, I would like to point out that:

- **This course does not overlap with existing curriculum.** We submitted this new course request during the April 2018 CALS Curriculum Committee meeting, before any courses on the topic were proposed.
- **This course will complement our existing curriculum in horticultural crop production.** We currently offer commodity-specific courses in production of citrus (FRC3112), tree and small fruit (FRC3274), tropical and subtropical fruit (FRC3252), and vegetable (VEC3221C) crops.
- **Our department has subject-matter and instruction expertise in this area.** We have offered VEC2100 – *World Herbs and Vegetables* since Fall 2001. This Gen Ed course is popular among undergraduate students, and it serves as a recruitment platform for our undergraduate program. Additionally, we also currently offer HOS5711 – *Phytochemicals in Food and Health.* Undergraduate students have previously enrolled in this course. The proposed course will serve as a "bridge" between these two courses.
- **We are developing commodity-specific breeding courses in response to student and industry demand.** We routinely create special topics sections for undergraduate students to enroll in our graduate courses focused on vegetable (HOS5242) and fruit (HOS6201) breeding. Additionally, several of our industry partners are looking to hire students with crop-specific plant breeding expertise. This includes the medicinal plant industry, where several of our recent graduates are now employed. The proposed course is a response to our stakeholders' demands.
- **We are looking to expand course offerings in plant breeding.** The CALS Curriculum Committee conditionally-approved *Breeding and Genetics of Vegetable Crops* last April. Through this proposal we intend to create *Breeding and Production of Medicinal Plants and Herbs*. Finally, we are currently developing *Breeding and Genetics of Fruit Crops*. All commodity-specific breeding courses build upon existing courses in other academic units. As such, they include pre-requisites outside of our department.

As a department, we are devoted to building cross-department synergies in our curriculum. We are currently working on two new course proposals with colleagues in the Environmental Horticulture and Food Science & Human Nutrition Departments. Our intention is to develop high-quality, multidisciplinary curricula that prepare students for careers in the horticulture industry.

Sincerely,

Christine D. Chase

Christine D. Chase
Professor and Interim Chair
Horticultural Sciences Department

HOS3XXX – Breeding and Production of Medicinal Plants and Herbs

INSTRUCTOR: TBD

OFFICE HOURS: TBD

CREDIT HOURS: 3

PREREQUISITE: AGR 3303 or equivalent

MEETING TIMES AND LOCATION: TBD

COURSE DESCRIPTION

Medicinal plants are a rapidly-growing niche in horticulture. This course focuses on current and emerging breeding and cultivation practices used to produce high–value medicinal plants and herbs. Additionally, this course provides a critical analysis of health effects and therapeutic claims of plant-derived physiologically-active products.

LEARNING OBJECTIVES

Upon successful completion of this course, students will be able to:

- Discuss botany, economics, and regulation of medicinal plants and herbs
- Explain breeding strategies for manipulation of secondary metabolites
- Compare anecdotal and traditional medicine claims of efficacy against scientific literature
- Explain in general terms how hydroponic systems, soilless media, supplemental lighting, and CO_2 enrichment operate
- Discuss how physiological stress factors can be used to optimize secondary metabolite production
- Appraise the importance of the medicinal plant niche in horticulture

TEXTBOOKS

The following textbooks are required for the course. Links to peer-reviewed reading materials will be made available via canvas.

- *Wicked plants: The Weed that Killed Lincoln's Mother and Other Botanical Atrocities*, Amy Stewart, 2009, 1st edition. ISBN 978-1565126831
- *Ball Redbook Volume 2*, Jim Nau (Ed) 2011, 18th Edition. ISBN 978-1-883052-68-3

GRADING

Weekly quizzes **30 points**

Quizzes (2 pts each) will be available on Canvas every Friday. Students can use notes, websites, and textbooks as reference materials, but they must work individually.

Therapeutic claims project **20 points**

Traditional medicine and anecdotal descriptions about the health benefits of plant-derived compounds are abundant. However, these claims are rarely backed up by scientific evidence. The goal of this assignment is to compare and contrast an anecdotal or traditional medicine claim with findings from peer-reviewed literature.

For this assignment, students will identify and explain a therapeutic claim. A minimum of six sources with information about the selected therapeutic claim will be identified. Three of these sources must reflect anecdotal or traditional medicine claims and the other three sources must be peer-reviewed scientific publications. Students will write a 1,000-word blog post where the health effects and therapeutic claims of plant derived physiologically-active products will be critically analyzed. This blog post can be hosted in any blogging site (wordpress.com, blogger.com, etc.).

Additional details about this project will be provided in class.

Breeding strategy project **30 points**

Herbs and medicinal plants are largely understudied horticultural commodities. Thus, adaptation of strategies from other horticultural crops is necessary for successful breeding and cultivation of high-value medicinal plants and herbs. In this assignment, students will identify a breeding strategy currently used in a well-studied horticultural greenhouse crop (e.g.. tomato, cucumber, pepper) and propose its application to a medicinal plant or herb. The proposal will consist of a short literature review (500 words, 8 points), a breeding strategy rationale (1000 words, 14 points), and a written plan for implementation (500 words, 8 points). Additional details and a grading rubric will be provided in class.

Exams **20 points**

There will be a mid-term and final exam, each worth 10 points. The final will be given during exam week. Exams will include questions requiring long and short answers. A sample exam will be provided to aid in studying for the midterm and final exams.

GRADING SCALE (Points)

A = 89.5 – 100	C = 69.5 – 75.4
B+ = 84.5 - 89.4	D+ = 65.5 – 69.4
B = 79.5 – 84.4	D = 59.5 – 65.4
C+ = 75.5-79.5	E = <59.5

Grades and Grade Points: For information on current UF policies for assigning grade points, see catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

COURSE POLICIES:

Attendance and Make-up Work: Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Online Course Evaluation Process: Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at www.evaluations.ufl.edu

Evaluations are typically open during the last two or three weeks of the semester. Students will be notified of the specific times when evaluations for this course are open. Summary results of these assessments are available to students at: www.evaluations.ufl.edu/results

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code

Software Use

All faculty, staff and students of the university are required and expected to obey the 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 when appropriate.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing

special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

- Disability Resource Center, 0001 Reid Hall, (352) 392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling and Wellness Center, 3190 Radio Road, 392-1575, www.counseling.ufl.edu

  Counseling Services
  Groups and Workshops
  Outreach and Consultation
  Self-Help Library
  Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu
- Career Resource Center, CR-100 Reitz Union, 392-1601, www.crc.ufl.edu/next-level

Student Complaints

- Residential Courses: www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
- Online Course: www.distance.ufl.edu/student-complaint-process

Week	Lecture Topics
1	Botany and uses of medicinal plants
2	Economically important herbs
3	Functional foods and nutraceutical regulations under the FDA certified organic production and other labels
4	Germplasm collection and evaluation: From wild plant to cash crop
5	Breeding "orphan" crops: modern plant breeding in crops with limited genetic and genomic resources **Therapeutic claims project due**
6 - 7	Breeding for therapeutic compounds: anti-inflammatories, anti-microbials, antioxidants, psychoactives;
8	Breeding to reduce toxic compounds; **Mid-term exam**
9	Discussion: Wicked Plants
10	Cloning and propagation of medicinal plants and herbs
11	Open field, hydroponic systems, and soilless cultivation;
12	Supplemental lighting and photomorphogenic responses
13	Temperature control and CO_2 enrichment
14	Harvest and postharvest for fresh market production
15	Harvest and postharvest for processed production **Breeding strategy project due**