

MOSQUITO BIOLOGY

ENY 4905 (sections 128A, 128B, 128C), 3 credits

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Office hours: Monday 1:00pm – 2:00pm
(Office hours will be conducted by either instructor on the e-Learning in Sakai system using the Chat Room tab. Please join the Office hours room).

Venue and time: This course will be managed by e-Learning in Sakai (a broadband internet connection is strongly suggested). For suggested module section review dates, see course schedule. New lectures are available on Tuesdays and Thursdays during the fall semester in which the course is being offered; however as this is an online course, lectures may be viewed at any time after the beginning of the fall semester.

Co-taught course: ENY 6905

Course description: Mosquito Biology is an introduction to mosquito classification, natural history, ecology, physiology, population dynamics, mosquito-borne disease and control. The relationships between mosquitoes, humans, and the environment, along with the mechanisms of pathogen propagation and transmission will be emphasized. The course will be offered in an online format by experts at UF Florida Medical Entomology Laboratory.

General course information:

This is a co-taught course being offered at the undergraduate and graduate levels. Although the lectures are the same, there are substantial differences in student expectations between the undergraduate and graduate levels. The lecture consists of modules encompassing broad fields of knowledge, each of which contains a number of sub-sections that detail these fields. Modules are provided by UF-Florida Medical Entomology Laboratory (FMEL) experts in these fields; email addresses are provided. To facilitate lecturer-learner interaction, students may contact the course instructors (Drs. Smartt and Alto) by e-mail. Requests to take this course offline by CD/DVD should be sent to the course directors. Questions pertaining to the course organization or overall structure should be sent to one of the course directors. All course communication will be via the course web site and course email. Students are responsible for notices or course updates

posted using these methods and should notify the course directors if difficulty in electronic communication occurs or is expected. This is a co-taught course being offered at the undergraduate and graduate levels and additional tasks for graduate students include a review project, discussion group, and more rigorous exams.

Course objectives: Upon the successful completion of this course students shall be able to:

- 1) Understand the fundamental biological processes governing the various life stages of the mosquito.
- 2) Identify human practices that promote the proliferation of anthropophilic mosquito species.
- 3) Analyze the suitability of an environment to support immature and adult mosquitoes in terms of its ecological factors, and to furthermore evaluate the suitability of the environment for mosquito-borne disease transmission.

Topic Outline:

Six critical areas of mosquito biology will be offered to students: (course modules)

- 1) Classification– an exploration of the origin and amazing diversity of mosquito species (Dr. R.C. Connelly)
- 2) Natural History and Ecology – the complex interactions of the mosquito with its environment (Drs. L.P. Lounibos and G.F. O’Meara)
- 3) Physiology – the details of the inner workings of the mosquito through its life stages (Drs. B.W. Alto and C.T. Smartt)
- 4) Population Dynamics – predicting and understanding the dynamics of mosquito populations (Drs. C.C. Lord and W.J. Tabachnick)
- 5) Mosquito-borne Disease– entomological mechanisms of pathogen propagation and transmission (Drs. B.W. Alto, J.F. Day, L.P. Lounibos and C.C. Lord)
- 6) Control of Mosquitoes– a comprehensive review of the approaches used to mitigate mosquito impacts on human health and development (Drs. J.R. Rey, and R.C. Connelly)

Prerequisites:

There are no prior coursework requirements to enroll; however basic knowledge of ecology, cell biology, genetics, and molecular biology is highly recommended. Students are encouraged to

contact the course director with questions.

Required and recommended textbooks:

Lectures and required reading materials will be posted on the e-Learning Sakai site, along with suggestions for further reading, usually in the form of primary literature. There is no required textbook for the course. The reading list is posted on Sakai via PDFs. The textbooks will be reserved and made available to students for use at the UF Marston Science Library (444 Newell Drive, Gainesville, FL 32611). Select excerpts of the textbooks will be made available on Sakai via PDFs.

Required textbooks:
None

Suggested textbooks:
Clements, A.N. 2000. The biology of mosquitoes, volume 1: Development, nutrition, and reproduction. CABI Publishing. New York, NY.

Abbreviated required reading list:
Begon, M., Townsend, C., and J. Harper. 2005. Ecology- from individuals to ecosystems, 4th edition. Blackwell Publishing. Danvers, MA. 752pp.
Focks, D.A., Daniels, E., Haile, D.G., and J.E. Keesling. 1995. A simulation model of the epidemiology of urban dengue fever: literature analysis, model development, preliminary validation, and samples of simulation results. American Journal of Tropical Medicine and Hygiene. 53(5): 489-506
Lounibos, L.P. and C.E. Machado-Allison. 1986. Mosquito maternity: egg brooding in the life cycle of *Trichoprosopon digitatum*, pp. 172-184. In Evolution of Insect Life Cycles, editors F. Taylor and K. Karban. Springer-Verlag. New York.

Evaluation:

Grading will be based on student performance on total percentage earned of total points on the following assignments that make up the evaluation criteria:

Evaluation criteria	Points	Due dates
Exam 1 (midterm)	115	October 11
Exam 2	100	December 4
Total	215	

Exams: Exam 1 (midterm) and Exam 2 include short answer and/or essays questions. Exams will differ between the co-taught undergraduate and graduate courses. Exams will be made available to students on the e-Learning in Sakai site at 10am EST on October 11 (Exam 1, midterm) and December 13 (Exam 2) and are due 48 hours later (10 am EST 2 days later). Exams are open book/notes, but are expected to be individual efforts. Students will be graded on the completeness of their answers, as well as their insight. Grading will be completed by UF-FMEL experts for their sections (see section on Topic Outline).

Policy related to class attendance:

The course is offered through e-Learning in Sakai. Lectures are pre-recorded and made available from the start to the end of the semester. No specific class attendance is required. Students are expected to view lectures, read course materials, and participate in online discussion groups within the time frame set by the instructors.

Policy related to make-up exams or other work:

In general, acceptable reasons to make-up exams or other course related work is limited to serious illness, family emergencies, military obligation, or court imposed legal obligations. Students who have excused absences for University sponsored groups must arrange for missed examinations ahead of the exam with the lead instructors. Other reasons may also be approved but will be taken into consideration on a case-by-case basis.

Grades and Grade Points:

This course does NOT utilize “plus” or “minus” grades. Although the following link is for the undergraduate catalog, it applies to graduate students. For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

The grading scale for this course is as follows:

Grading scale (%) of total points:

90-100	A
80-89.99	B
70-79.99	C
60-69.99	D
<60	E

Academic Honesty, Software Use, Campus Helping Resources, Services for Students with Disabilities:

Academic Honesty

In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

The Honor 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.

On all work submitted for credit by students at the university, the following pledge is either required or implied: "**On my honor, I have neither given nor received unauthorized aid in doing this assignment.**"

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

(Source: 2011-2012 Undergraduate Catalog)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this 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.

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
 - Training Programs
 - Community Provider Database
- *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

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.

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

Plagiarism: Plagiarism is a serious violation of the Student Honor Code. The Honor Code prohibits and defines plagiarism as follows: Plagiarism. A student shall not represent as the student's own work all or any portion of the work of another. Plagiarism includes (but is not limited to):

a. Quoting oral or written materials, whether published or unpublished, without proper attribution.

b. Submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

(University of Florida, Student Honor Code, 15 Aug. 2007

<<http://www.dso.ufl.edu/judicial/honorcode.php>>)

University of Florida students are responsible for reading, understanding, and abiding by the entire Student Honor Code (<http://www.dso.ufl.edu/sccr/honorcode.php>).

COURSE SCHEDULE
 ENY 4905, (sections 128A, 128B, 128C), 3credits
 Tuesday (a) and Thursday (b)

<u>Lecture Topic</u>	<u>Week – Lecture</u>	<u>Suggested Review Date</u>	<u>Lecturer</u>
Introduction			
Overview	(1 – lecture b)	23Aug	Alto
Classification			
Introduction		28Aug	Smartt
Mosquito Morphology and Structural Evolution	(2 - lecture a)	28Aug	Connelly
Taxonomy and Diversity	(3 - lecture b)	30Aug	Connelly
Natural History and Ecology			
Introduction		4 Sep	Lord
Mosquito Eggs	(4 - lecture a)	4 Sep	Lounibos
Mosquito Larval	(5 - lecture b)	6Sep	Lounibos
Adult Mosquitoes - I	(6 - lecture b)	8Sep	O’Meara
Adult Mosquitoes - II	(7 - lecture a)	11Sep	O’Meara
Physiology			
Introduction		13Sep	Smartt
Oogenesis	(8 - lecture b)	13Sep	Smartt
Digestion	(9 - lecture a)	18Sep	Alto/Smartt
Biology of Immature Mosquitoes - I	(10 - lecture b)	20Sep	Alto
Biology of Immature Mosquitoes - II	(11 - lecture a)	25Sep	Alto
Adult Mosquitoes - I	(12 - lecture b)	27Sep	Smartt
Adult Mosquitoes - II	(13 - lecture a)	2Oct	Smartt
Population Dynamics			
Introduction		4Oct	Lord
Modeling Vector-borne Disease - I	(14 - lecture b)	4Oct	Lord
Modeling Vector-borne Disease - II	(15 - lecture a)	9Oct	Lord
EXAM 1 (MIDTERM)		11Oct	
Mosquito Genetics & Pop. Genetics I	(16 - lecture a)	16Oct	Tabachnick
Population Genetics II & III	(17 - lecture b)	18Oct	Tabachnick

Mosquito-borne disease			
Introduction		23Oct	Lord
Arboviruses/ Epidemiology of			
Mosquito-borne Viruses –I	(18 - lecture a)	23Oct	Alto
Epidemiology of Mosquito-			
borne Viruses II & III	(19 - lecture b)	25Oct	Day
Malaria	(20 - lecture a)	30Oct	Lounibos
Filariasis	(21 - lecture b)	1Nov	Alto
Multispecies & Disease Models	(22 - lecture a)	6Nov	Lord
Control of Mosquitoes			
Introduction		8Nov	Smartt
Chemical Control	(23 - lecture b)	8Nov	Rey
Biological Control	(24 - lecture a)	13Nov	Rey
Source Reduction	(25 - lecture b)	15Nov	Rey
IPM and Control Programs	(26 - lecture a)	20Nov	Connelly
THANKSGIVING HOLIDAY		22Nov	
Introduction to Genetic			
Engineering	(27 - lecture b)	27Nov	Alto/Smartt
Genetic Engineering	(28 - lecture a)	29Nov	Smartt/Alto
EXAM 2		4Dec	

Lectures are of varying lengths and some consist of subsections. PDF files (low-resolution) of the slides for each lecture are provided to assist in review and time management.