

Title: Biosynthetic Logic of Medicinal Natural Products (3 Credits) (PHA/CHM 6435 Sections: 4G71/ 2C99)

Instructors:

Dr. Yousong Ding	HSC P6-27	Tel: 273-7742	email: yding@cop.ufl.edu	OHS TBA
Dr. Steven Bruner	JHH 302E	Tel: 392-0525	email: bruner@ufl.edu	OHS TBA

Class Time: Aug 21 to Oct 9: **Monday/Wednesday/Friday: 10:40 am-11:30 am (CHM)**
Oct 14 to Dec 4: **Monday: 11:45 am-12:35 pm / Wednesday: 11:45 am-1:35 pm (PHA)**

Description: The course will outline of the major families of medicinal natural products, how they are biosynthesized, structural and biochemical understanding of their biosynthetic logic, gene cluster identification, genome mining, and production of bioactive “unnatural products” for drug discovery and development. Students will gain a general understanding of how Nature creates these bioactive chemicals.

Suggested reference text: Paul M. Dewick, Medicinal Natural Products: A Biosynthetic Approach, 3rd Edition
ISBN: 978-0-470-74168-9, Wiley Press (**Not required**)

Learning objectives:

After completing this course, successful students will be able to:

1. Describe the major types of bioactive natural products.
2. Discuss the biosynthesis of major types of bioactive natural products.
3. Explain structural characterization of natural products biosynthesis.
4. Identify natural products gene clusters.
5. List, describe, and compare the common approaches to create “unnatural products” for drug discovery.

Course Format:

Course materials will be delivered using traditional lectures, assigned reading, presentation and classroom discussions.

Exams and grading:

The students will be evaluated in class attendance (20 points), presentation (50 points), classroom discussions (30 points), and three exams each worth 100 points. Students will be allowed to inspect their exams to verify their scores but exam will be kept by the faculty for 3 years. A key of correct answers for each exam during the semester will be kept on reserve so that students can determine whether they have properly applied the processes of induction and deduction to arrive at their answers.

Grading will be on a point basis with 93-100 (A), 90-92.9 (A-), 87-89.9 (B+), 83-86.9 (B), 80-82.9 (B-), 77-79.9 (C+), 73-76.9 (C), 70-72.9 (C-), 67-69.9 (D+), 63-66.9 (D), 60-62.9 (D-), <60 (E).
There will be no make-up exams.

For information on UF's Grading Policy: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>;
<http://www.isis.ufl.edu/minusgrades.html>

Miscellaneous:

Class attendance is not mandatory. However, the student will be tested on the lecture material and in-class handouts which, for the most part, are not covered in precisely the same way in any available textbook.

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. Contact the Disability Resources Center (<http://www.dso.ufl.edu/drc/>) for information about available resources for students with disabilities.

Students are expected to complete assignments and take quizzes with integrity. Academic dishonesty will not be tolerated. If a student commits academic dishonesty, the academic penalty will be a failing grade in the course. The UF policies and procedures on academic dishonesty will be followed. For University of Florida's honor code, see <http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>.

PHA6435 Fall 2019

	Time	Classroom	Topics
1	Wednesday, August 21, 2019	LEI 242	Course introduction and Survey of natural products
2	Friday, August 23, 2019	LEI 242	Polyketides, assembly line methodology and gene clusters
3	Monday, August 26, 2019	LEI 242	Polyketides, assembly line methodology and gene clusters
4	Wednesday, August 28, 2019	LEI 242	Polyketides, structure and enzyme mechanism
5	Friday, August 30, 2019	LEI 242	Polyketides, structure and enzyme mechanism
6	Wednesday, September 4, 2019	LEI 242	Polyketides, post-translational modification and activity
7	Friday, September 6, 2019	LEI 242	Nonribosomal peptides, assembly line methodology and gene clusters
8	Monday, September 9, 2019	LEI 242	Nonribosomal peptides, assembly line methodology and gene clusters
9	Wednesday, September 11, 2019	LEI 242	Nonribosomal peptides, structure and mechanism
10	Friday, September 13, 2019	LEI 242	Nonribosomal peptides, modification and hybrid systems
11	Monday, September 16, 2019	LEI 242	Nonribosomal peptides, modification and hybrid systems
12	Wednesday, September 18, 2019	LEI 242	Complex PKS/NRPS gene clusters
13	Friday, September 20, 2019	LEI 242	Complex PKS/NRPS gene clusters
14	Monday, September 23, 2019	LEI 242	EXAM #1
15	Wednesday, September 25, 2019	LEI 242	Terpenoid biosynthetic pathways and natural products
16	Friday, September 27, 2019	LEI 242	Structure and mechanism of terpenoid enzymes
17	Monday, September 30, 2019	LEI 242	Structure and mechanism of terpenoid enzymes
18	Wednesday, October 2, 2019	LEI 242	Alkaloid biosynthetic pathways and natural products
19	Monday, October 7, 2019	LEI 242	Complex alkaloid gene clusters and enzyme mechanism
20	Wednesday, October 9, 2019	LEI 242	Complex alkaloid gene clusters and enzyme mechanism
21	Monday, October 14, 2019	HSC C2-33	Overview of natural products isolation and purification
22	Wednesday, October 16, 2019	HSC C1-17	Identification of natural product gene cluster: canonical and new approaches
23	Monday, October 21, 2019	HSC C2-33	Computational approaches in natural products research I
24	Wednesday, October 23, 2019	HSC C1-17	Computational approaches in natural products research II
25	Monday, October 28, 2019	HSC C2-33	EXAM #2
26	Wednesday, October 30, 2019	HSC C1-11	Protein engineering in natural products research I: tailoring enzymes
27	Monday, November 4, 2019	HSC C2-33	Protein engineering in natural products research II: core biosynthetic enzymes
28	Wednesday, November 6, 2019	HSC C1-15	Chemistry-oriented approaches for the production of unnatural products
29	Wednesday, November 13, 2019	HSC CG-41	Activation of cryptic gene clusters
30	Monday, November 18, 2019	HSC C2-33	SynBiol in natural products research I: Heterologous expression
31	Wednesday, November 20, 2019	HSC C1-17	SynBiol in natural products research II: Combinatorial biosynthesis
32	Monday, November 25, 2019	HSC C2-33	SynBiol in natural products research III: Host development and pathway assembly
33	Monday, December 2, 2019	HSC C2-33	SynBiol in natural products research III: Optimization of productivity
34	Wednesday, December 4, 2019	HSC C1-11	EXAM #3