

Title: Biosynthetic Logic of Medicinal Natural Products (3 Credits) (PHA/CHM 6435 Sections: 2C99/BP35)

Instructors:

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Class Time: Aug 23 to Oct 11: Monday/Wednesday/Friday: 10:40 am-11:30 am (Chem)
Oct 15 to Dec 3: Monday: 10:40 am-12:30 am / Friday: 10:40 am-11:30 am (Pharm)

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:

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 2021

	Time	Classroom	Topics
1	Monday, Aug 23, 2021	TUR 2322	Course introduction and Survey of natural products
2	Wednesday, Aug 25, 2021	TUR 2322	Polyketides, assembly line methodology and gene clusters
3	Friday, Aug 27, 2021	TUR 2322	Polyketides, assembly line methodology and gene clusters
4	Monday, Aug 30, 2021	TUR 2322	Polyketides, structure and enzyme mechanism
5	Wednesday, Sept 1, 2021	TUR 2322	Polyketides, structure and enzyme mechanism
6	Friday, Sept 3, 2021	TUR 2322	Polyketides, post-translational modification and activity
7	Wednesday, Sept 8, 2021	TUR 2322	Nonribosomal peptides, assembly line methodology and gene clusters
8	Friday, Sept 10, 2021	TUR 2322	Nonribosomal peptides, assembly line methodology and gene clusters
9	Monday, Sept 13, 2021	TUR 2322	Nonribosomal peptides, structure and mechanism
10	Wednesday, Sept 15, 2021	TUR 2322	Nonribosomal peptides, modification and hybrid systems
11	Friday, Sept 17, 2021	TUR 2322	Nonribosomal peptides, modification and hybrid systems
12	Monday, Sept 20, 2021	TUR 2322	Complex PKS/NRPS gene clusters
13	Wednesday, Sept 22, 2021	TUR 2322	Complex PKS/NRPS gene clusters
14	Friday, Sept 24, 2021	TUR 2322	EXAM #1
15	Monday, Sept 27, 2021	TUR 2322	Terpenoid biosynthetic pathways and natural products
16	Wednesday, Sept 29, 2021	TUR 2322	Structure and mechanism of terpenoid enzymes
17	Friday, Oct 1, 2021	TUR 2322	Structure and mechanism of terpenoid enzymes
18	Monday, Oct 4, 2021	TUR 2322	Alkaloid biosynthetic pathways and natural products
19	Wednesday, Oct 6, 2021	TUR 2322	Complex alkaloid gene clusters and enzyme mechanism
20	Monday, Oct 11, 2021	TUR 2322	Complex alkaloid gene clusters and enzyme mechanism
21	Friday, Oct 15, 2021	HSC C1-09	Overview of natural products isolation and purification/Identification of BGC
22	Monday, Oct 18, 2021	HSC C1-11	Identification of BGC: new approaches + computational I
23	Friday, Oct 22, 2021	HSC C1-09	Computational approaches in natural products research I
24	Monday, Oct 25, 2021	HSC C1-11	Computational approaches in natural products research I+II
25	Wednesday, Oct 27, 2021	HSC C1-07	EXAM #2
26	Monday, Nov 1, 2021	HSC C1-11	Protein engineering in natural products research I: tailoring enzymes
27	Friday, Nov 5, 2021	HSC C1-09	Protein engineering in natural products research II: core biosynthetic enzymes
28	Monday, Nov 8, 2021	HSC C1-11	Chemistry-oriented approaches for the production of unnatural products
29	Friday, Nov 12, 2021	HSC C1-09	Activation of cryptic gene clusters
30	Monday, Nov 15, 2021	HSC C1-11	SynBiol in natural products research I: Heterologous expression
31	Friday, Nov 19, 2021	HSC C1-09	SynBiol in natural products research II: Combinatorial biosynthesis
32	Monday, Nov 22, 2021	HSC C1-11	SynBiol in natural products research III: Host development and pathway assembly
33	Friday, Dec 3, 2021	HSC C1-09	SynBiol in natural products research III: Optimization of productivity
34	Wednesday, Dec 8, 2021	HSC C1-07	EXAM #3