

## Syllabus SIO 264 – Spring 2020

Biosynthesis of Marine Natural Products  
9:00 – 10:50 AM Tues/Thurs  
<https://ucsd.zoom.us/j/629899621>  
(4 Units)

Instructors: Bradley Moore (bsmoore@ucsd.edu) and Bill Gerwick (wgerwick@ucsd.edu)

This course will closely examine the biosynthesis of specific and highly prominent marine natural products as they illustrate and illuminate major metabolic trends in the marine environment. Each compound will be examined in a multidimensional discussion of structure, biological activity, and biosynthesis at the mechanistic, enzymological and genomic levels. Students will gain deep insights into the major classes of marine specialized metabolites and the biosynthetic processes used in their creation. On-line, in-class and homework problem-based assignments will provide students opportunities to develop their skills in deducing origins of natural products, the process for their assembly, and deduction of structures from genetic sequence information.

<u>Date</u>	<u>Topic</u>	<u>Lecturer</u>
March 31	Introduction to biosynthesis	Moore
April 2	Biosynthesis – general principles / pathways	Moore
April 7	Redox reactions common in secondary metabolism	Moore
April 9	Biohalogenation	Moore
April 14	Terpene biosynthesis	Gerwick
April 16	Terpene cyclases	Gerwick
April 21	Oxylipin biosynthesis	Gerwick
April 23	PUFA synthase and marine lipids	Gerwick
April 28	Polyketide synthase assembly line biochemistry I	Moore
April 30	Polyketide synthase assembly line biochemistry II	Shende
May 5	Nonribosomal peptide synthetase assembly line biochemistry I	Gerwick
May 7	Nonribosomal peptide synthetase assembly line biochemistry II	Gerwick
May 12	Hybrid PKS-NRPS biosynthesis	Moore
May 14	Aromatic polyketide biosynthesis	Moore
May 19	Ladder ether dinoflagellate polyketides	Gerwick
May 21	RiPP peptides	Chekan
May 26	Cyanobacterial alkaloids	Gerwick
May 28	Sponge alkaloids	Molinski
June 2	Biosynthetic cascade reactions	Moore
June 4	Genome mining	Moore

### Course Objectives

1. To expose students to some of the more impactful and interesting marine natural products, including their discovery, structure determination, chemical ecology, and pharmacological properties

2. To develop an appreciation of the typical biosynthetic units comprising marine natural products in different biosynthetic classes
3. To develop an understanding of the mechanistic chemistry that assembles the biosynthetic units that comprise marine natural products
4. To develop knowledge of the biosynthetic enzymes that create diverse marine natural products, as well as the corresponding gene clusters and their architecture

### Text

Primary literature to be assigned in class

### Grading

**Reading Reflections** – 9 x 10 pts = 90 points total (due on Mondays)

**Homeworks** – 9 @ 10pts = 90 points total (due on Fridays)

**Final Presentation** – 50 points (date TBD during finals week; details to follow)