

Course Syllabus

Hydrothermal Vents (11:628:341:01)

Days and Times: Tuesday and Thursday, 2:00 PM - 3:20 PM

Alampi Room, Marine and Coastal Sciences Bldg., Cook Campus

Course Duration: Spring Semester (2025))

CONTACT INFORMATION

Course Instructor and Contact Point:

Richard A. Lutz (rlutz@marine.rutgers.edu)

The easiest way to get answers about course-related questions is to contact the instructor by email (rlutz@marine.rutgers.edu). Make sure you include your Rutgers email in the subject line.

Text for the Course: “*The Ecology of Deep-Sea Hydrothermal Vents*” by C. L. Van Dover – the text is available in new or used paperback or via Kindle on Amazon (link is: https://www.amazon.com/Books-PNG/s?rh=n%3A283155%2Cp_27%3APNG)

Additional readings will be posted weekly in the Modules section of Rutgers Canvas prior to the class covering the material in the readings.

LEARNING GOALS:

- To understand the structure of, and biological and geological processes occurring in, hydrothermal vent systems throughout the world’s oceans
- To understand the contrast between non-vent and vent environments in the deep sea
- To understand the unique chemical properties of hydrothermal systems
- To understand factors contributing to biological succession at deep-sea hydrothermal vents
- To be able to compare and contrast photosynthesis and chemosynthesis (using equations as appropriate), with special reference to chemosynthetic pathways in deep-sea hydrothermal ecosystems and the microorganisms that utilize these pathways.
- To understand the unique biological, geological and chemical processes occurring at deep-sea hydrothermal vents situated along sediment-covered ridge axes (e.g., Guaymas Basin in the Gulf of California)
- To understand the similarities between deep-sea hydrothermal vent and cold-water sulfide/methane seep ecosystems, both of which are ultimately based on chemosynthesis

- To understand how the relatively sedentary organisms inhabiting deep-sea hydrothermal vent and cold-water sulfide/methane seeps disperse to and colonize similar environments that can be located hundreds of kilometers away
- To understand various hypotheses concerning whether or not life may have originated at deep-sea hydrothermal vent
- To understand the importance of symbiotic relationships at deep-sea hydrothermal vents and cold-water sulfide/methane seeps
- To learn about the possibility that past and/or present hydrothermal systems and associated life forms may exist on extra-terrestrial bodies (e.g., Europa, Enceladus, Mars)

COURSE CONTENT TO MEET LEARNING GOALS (additional readings may be assigned for certain classes):

Class 1: Expectations of students, structure of course and discussion of learning goals (Reading Assignment: Chapter 1 in text)

Class 2: Lecture/discussion of the non-vent deep-sea environments and deep-sea vent ecosystems

Class 3: Lecture/discussion/documentary of history of deep-sea hydrothermal vent discoveries (Reading Assignment: Chapter 2 in text)

Class 4: Lecture/discussion of geological setting of hydrothermal vents (Reading Assignment: Chapter 3 in text)

Class 5: Lecture/discussion of chemical and physical properties of vent fluids (Reading Assignment: Chapter 4 in text)

Class 6: Lecture/discussion of hydrothermal plumes (Reading Assignment: Chapter 7 in text)

Class 7: Lecture/discussion of physiological ecology at deep-sea hydrothermal vents (Reading Assignment: Chapter 8 in text)

Class 8: Lecture/discussion of trophic ecology at deep-sea hydrothermal vents (Reading Assignment: Chapters 5 and 6 in text)

Class 9: Guest Lecture on microbiology of deep-sea hydrothermal vents by Dr. Constantino Vetriani (Reading Assignment: Chapter 9 in text)

Class 10: Lecture/discussion of reproductive ecology at deep-sea hydrothermal vents (Reading Assignment: Chapter 10 in text)

Class 11: Lecture/discussion of community dynamics at deep-sea hydrothermal vents (Reading Assignment: Chapter 11 in text)

Class 12: Lecture/discussion of evolution and biogeography (Reading Assignment: Chapter 12 in text)

Class 13: Lecture/discussion of cognate communities (e.g., cold-water sulfide/methane seeps)
(Reading Assignment: Chapter 13 and 14 in text)

Class 14: Showing of high resolution Blu-Ray format of Rutgers-produced IMAX documentary (“Volcanoes of the Deep Sea”) in the Alampi Auditorium of the Marine and Coastal Sciences Building followed by discussion of the documentary

Class 15: Mid-term exam

SPRING RECESS

Class 16: Student Paper Presentation and follow-up class discussion

Class 17: Student Paper Presentation and follow-up class discussion

Class 18: Student Paper Presentation and follow-up class discussion

Class 19: Student Paper Presentation and follow-up class discussion

Class 20: Student Paper Presentation and follow-up class discussion

Class 21: Student Paper Presentation and follow-up class discussion

Class 22: Student Paper Presentation and follow-up class discussion

Class 23: Student Paper Presentation and follow-up class discussion

Class 24: Student Paper Presentation and follow-up class discussion

Class 25: Student Paper Presentation and follow-up class discussion (Research Papers Due)

Class 26: Synthesis and discussion of topics covered during the course

Class 27: Research papers handed back followed by questions and discussion of research papers

PAPER PRESENTATION

Presentation of assigned papers (sent via email during second week) will be 15-20 min long followed by a class discussion of the material covered. The presentation should be supplemented with visual materials and presented as a powerpoint presentation or via some other compatible format that can be easily viewed by the class. The following 2 links are to a presentation put together by a student in a previous Hydrothermal Vents course to give you an example of the kind of presentation you can make:

https://www.youtube.com/watch?v=cPCfq_71d2o&feature=youtu.be (Links to an external site.)

RESEARCH PAPER

Research papers are to be turned in during the second to last class period. Papers will be:

- (1) Text consisting of 10-15 double-spaced pages (12 pt. Times New Roman, 1" margins)
- (2) A Literature Cited section is required in addition to the 10-15 pages (format of references is that found in the References sections of your "*The Ecology of Deep-Sea Hydrothermal Vent*" text). References should be from peer-reviewed scientific papers – references to websites are not to be included in Literature Cited section.
- (3) Figures are encouraged, but are in addition to the 10-15 pages of text.
- (4) In the "Files" section, there is an example of a paper put together by one of the students in a previous year's class see the following pdf file in the Files section: "Cassandra Cohen ... *Rimicaris exoculata* term paper final draft 2.pdf"

ASSESSMENT AND GRADING

Grading will be based on:

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| (1) Mid-term exam | 40% |
| (2) Presentation to the class of assigned paper | 15% |
| (3) Research paper on topic related to assigned paper | 40% |
| (4) Class attendance | 5% |

ACADEMIC INTEGRITY REGARDING RESEARCH PAPER

The rule is simple don't plagiarize. Plagiarism or any other form of academic fraud will not be tolerated. It will be punished to the full extent, especially given that you are capable of being an original explorer and thinker. In the process of writing your paper, always cite your source e.g., (Van Dover, 2000) and use quotes on either side of a statement quoted verbatim. **The complete academic integrity policy can be found here:**

<https://academicintegrity.rutgers.edu/>

DISABILITY SERVICES

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are

officially enrolled, participate in an intake interview, and provide documentation:
<https://ods.rutgers.edu/students/documentation-guidelines> (Links to an external site.)

[Links to an external site.](#) If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/getting-registered>

ATTENDANCE

Attendance at all class meetings is expected. If you expect to miss any class, use the University absence reporting website <https://sims.rutgers.edu/ssra/> (Links to an external site.)

[Links to an external site.](#) to indicate the date and reason for your absence. You should also send an email to the instructor (i.e., me)

Grading scale:

90-100 A

85-89 B+

80-84 B

75-79 C+

70-74 C

60-69 D

<60 F