



# Coral Reef Ecology Biology 253

Dr. D. H. Kesler



This course will meet Monday afternoons and Wednesday evenings. The Monday classes will focus mainly on the basics of the organisms living in coral reef ecosystems.

The **objectives of the Monday classes** are to:

- introduce you to the faunal and floral components of coral reef ecosystems,
- sensitize you to the plight of these ecosystems,
- develop observational skills,
- develop writing skills through journaling,
- prepare for the two-week course in Honduras.

The format of the Monday classes will be mostly lecture, although there will be two lab exercises. There will be WebCT quizzes, an expectation of journaling, and a final exam.

The **objectives of the Tuesday evening classes** are to:

- allow you an in-depth look at the questions coral reef ecologists ask,
- develop a working vocabulary and perspective of coral reef ecologists,
- develop your reading and thinking skills by dealing with articles written by marine biologists for marine biologists, and by doing so you are becoming more of scientist yourself.

The format of the Tuesday evening class will be discussion. We will all read the assigned papers. Each week assigned students will present/critique the paper or papers, and criteria for evaluation of these presentations include depth of understanding of the material, clarity of presentation, and ability to engage the class in discussion. Simply summaries of the articles will be frowned upon.

When it is not your week to present a paper, you are expected to provide written responses, i.e., a question and a comment/critique, about each of these papers, which reflect a thorough wrestling with the material. Class participation through substantive discussion is expected of you. Written responses not complete at the beginning of class will receive zero credit. There will be a final, written exam at the completion of the course. You will be asked to submit questions for this exam.

### Expectations

I expect all students in this course to have a genuine interest in biological systems. Without this endogenous interest students will have a difficult time successfully fulfilling the requirements of this course. Given that this course awards upper-level biology credit, I expect that students will be involved in the processes of putting names to organisms, reading and evaluating primary literature, developing their observation and writing skills, and making the most out of this opportunity that they can.

### Grading

		Grades will be awarded on the following scale:	
WebCT quizzes	100 points		
Lab Exercises	20 points	100-92%	A
Midterm Exam	50 points	92-90%	A-
Journals	50 points	90-88%	B+
Critiques	150 points	88-82%	B
Participation/Presentation	30 points	82-80%	B-
Final Exams	<u>100 points</u>	80-78%	C+
		78-72%	C
Total	500 points	etc.	

## Class Schedule

DAY	DATE	TOPIC	REQUIRED READING
Wednesday	January 9	Introduction	Alevizon <sup>1</sup> , Chap 1&2 Davidson <sup>2</sup> , Chap 1&2
Monday	14	Introduction Coral Biology	
<b>Wednesday</b>	<b>16</b>	<b>No Class</b>	
Monday	21	MLK Day	
<b>Wednesday</b>	<b>23</b>	<b>Discussion 1</b>	Davidson, Chap 1&2
Monday	28	Coral identification lab	
<b>Wednesday</b>	<b>30</b>	<b>Discussion 2 &amp; 3</b>	Hughes (1994); Aronson and Precht (2006)
Monday	February 4	Coral key evaluations	Davidson, Chap 3-7
<b>Wednesday</b>	<b>6</b>	<b>Discussion 4</b>	Fitt et al. (2001)
Monday	11	Reef Structure	
<b>Wednesday</b>	<b>13</b>	<b>Discussion 5 &amp; 6</b>	Bak et al. (2005; Lamb and Swart (2007)
Monday	18	Coral Diseases	
<b>Wednesday</b>	<b>20</b>	<b>Discussion 7 &amp; 8</b>	Harvel et al. (1999); Wulff (2006)
Monday	25	Midterm Lecture Exam – Journals Due	
<b>Wednesday</b>	<b>27</b>	<b>Discussion 9 &amp; 10</b>	Voss & Richardson (2006); Nugues and Roberts (2003)
MWF	March 3-7	Spring Break	Alevizon, Chaps 3-6 Davidson, Chaps 8&9
Monday	10	Fishes	Alevizon, Chap 7
<b>Wednesday</b>	<b>12</b>	<b>Discussion 11 &amp; 12</b>	Lirman (1994); White et al. (2007)
Monday	17	Fish Behavior	
Wednesday	19	Easter Recess	
Monday	24	Invertebrates	Davidson, Part II
<b>Wednesday</b>	<b>26 – 5:00-8:00 PM</b>	<b>Dinner and Discussion 13</b> - Dr. Gannon	Water Quality Article TBA
Monday	31	Invertebrates	
<b>Wednesday</b>	<b>April 2</b>	<b>Discussion 14</b>	Little et al. (1995)
Monday	7	Carbon Chemistry	
<b>Wednesday</b>	<b>9</b>	<b>Discussion 15 &amp; 16</b>	Feely et al. (2007); Nakamura and Nakamori (2007)
Monday	14	Algae – Mangroves	
<b>Wednesday</b>	<b>16</b>	<b>Discussion 17</b>	Ellison et al. (1996)
Monday	21	Dolphin biology	
<b>Wednesday</b>	<b>23</b>	<b>Discussion 18</b> – last day of classes	Richmond et al. (2007)
	TBA	Final examinations	

<sup>1</sup> Alevizon, W.S. 1994. Pices Guide to Caribbean Reef Ecology. Gulf Publishing Company – suggested as a very basic introduction to the material. Copies are on reserve in Barret Library.

<sup>2</sup> Davidson, O.G. 1998. The Enchanted Braid. John Wiley & Sons. – required reading and journaling subject

## Specific Article References

Date	Paper
<b>Jan. 23</b>	Introduction Davidson <sup>2</sup> , Chap 1 & 2
<b>Jan. 30</b>	Hughes, T.P. 1994. Catastrophes, phase shifts, and large-scale degradation of a Caribbean coral reef. <i>Science</i> 265:1547-1551. (Moodle) Aronson, R.B. and W.F. Precht. 2006. Conservation, precaution, and Caribbean reefs. <i>Coral Reefs</i> 25:441-450. (Moodle)
<b>Feb. 6</b>	Fitt, W.K., B.E. Brown, M.E. Warner, and R.P. Dunne. 2001. Coral bleaching: interpretation of thermal tolerance limits and thermal thresholds in tropical corals. <i>Coral Reefs</i> 20:51-65. (Moodle)
<b>Feb. 13</b>	Bak, R.P.M., G. Nieuwland, and E.H. Meesters. 2005. Coral reef crisis in deep and shallow reefs: E0 years of constancy and change in reefs of Curacao and Bonaire. <i>Coral Reefs</i> 24: 475-479. (Moodle)  Lamb, K. and P.K. Swart. 2007. The carbon and nitrogen isotopic values of particulate organic material from the Florida Keys: a temporal and spatial study. <i>Coral Reefs</i> , published on line Nov 2007. (Moodle)
<b>Feb. 20</b>	Harvell, C.D. et al. 1999. Emerging marine diseases- climate links and anthropogenic factors. <i>Science</i> 285:1505-1510. (Moodle)  Wulff, J.L. 2006. A simple model of growth form-dependent recovery from disease in coral reef sponges, and implications for monitoring. <i>Coral Reefs</i> 25:419-426. (Moodle)
<b>Feb. 27</b>	Voss, J.D. and L.L. Richardson. 2006. Nutrient enrichment enhances black band disease progression in corals. <i>Coral Reefs</i> 25: 569-576 (Moodle)  Nugues, M.M. and C.M. Roberts. (2003). Coral mortality and interaction with algae in relation to sedimentation. <i>Coral Reefs</i> 22:507-516. (Moodle)
<b>Mar. 12</b>	Lirman, D. 1994. Ontogenetic shifts in habitat preferences in the three-spot damselfish, <i>Stegastes planifrons</i> (Cuvier), in Roatan Island, Honduras. <i>J. Exp. Mar. Bio. and Ecol.</i> 180:71-81. (on reserve in Barret)  White, J.W., C.J. Grigsby, and R.R. Warner. 2007. Cleaning behavior is riskier and less profitable than an alternative strategy for a facultative cleaner fish. <i>Coral Reefs</i> 26:87-94. (Moodle)

**Mar. 26** Water Quality Article - TBA

**Apr. 2** Littler, M.M., D.S. Littler, and P.R. Taylor. 1995. Selective herbivore increases biomass of its prey: a chiton-coralline reef-building association. *Ecology*. 76:1666-1681. (Moodle)

**Apr. 9** Feely, R.A., C.L. Sabine, K. Lee, W. Berelson, J. Kleypas, V.J. Fabry, and F.J. Millero. 2007. Impact of anthropogenic CO<sub>2</sub> on the CaCO<sub>3</sub> system in the oceans. *Science* 305:362-366. (Moodle)

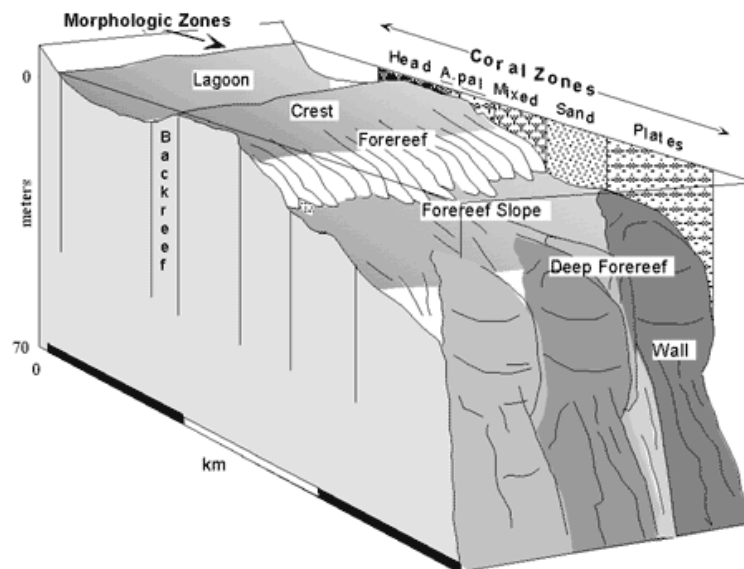
Nakamura, T. and T. Nakamori. 2007. A geochemical model for coral reef formation. *Coral Reefs* 26:741-755.

**Apr. 16** Ellison, A., E. J. Farnsworth, and R.R. Twiley. 1996. Facultative mutualism between red mangroves and root-fouling sponges in Belizean mangal. *Ecology* 77:2431-2444. (Moodle)

**Apr. 23** Richmond, R.H. et al. 2007. Watersheds and coral reefs: Conservation science, policy, and implementation. *BioScience* 57:598-607. (Moodle)

**Article that will be read at RIMS**

Pinder and Smits. 1993. The burrow microhabitat of the land crab *Cardisoma guanhumi*: respiratory/ionic conditions and physiological responses of crabs to hypercapnia. *Physiological Zoology* 66:216-236. (on reserve in Barret)



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