

**Marine Microbiology, OCSC 3600**  
 Department of Biology and Department of Ocean Sciences  
**Tuesdays and Thursdays 5:30 - 6:50 PM at Chemistry - Physics Bldg 4011**

**Instructor:** Dr. Javier Santander

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Office hours in-person: Dep. Ocean Sciences, AX3005. Open office hours and upon request. *Every effort will be made to respond to emails within 24 h, with the exceptions of evenings, weekends and holidays.*

**Course Description**

Marine Microbiology is a fast-developing area of science and it is a fundamental element in wide-ranging subjects from microbial ecology, bacterial host interaction, and marine microbial biotechnology.

OSCS3620 Marine Microbiology is a lecture-base course and will provide a general understanding of microbial activities in marine environments and their interactions with other organisms, ranging from deep vent invertebrates to commercially cultured fish species. This course will include topics linked to effluent discharge, microbial water quality, bacterial metabolism and nutrient cycles, bacterial-virus interaction and nutrient cycles, bacterial-host interaction including symbiosis and pathogenesis, and marine microbial biotechnology. Also, we will host short *online* seminars for invited researchers (e.g., graduate students).

**Lectures for our class will be held synchronously Tuesdays and Thursdays 5:30 - 6:50 PM at Chemistry - Physics Bldg 4011**

**Syllabus**

Dates	Topic	Unit	Reading assignment	Suggested Reading
<b>Lecture 1</b> Sep 6 <sup>th</sup>	Course objective and contents  Introduction to the Microbial World	I. Introduction to Marine Microbiology	<b>Chapter 1, Book Questioner</b>	
<b>Lecture 2</b> Sep 8 <sup>th</sup>	Bacteria and Archaea Structure		<b>Video links:</b> Video#1-8	<b>Chapters 2 &amp; 3, book</b>  <b>Article 1:</b> <a href="#">Annu. Rev. Microbiol. 2017. 71:519–38</a> <b>Article 2:</b> <a href="#">Cold Spring Harb Perspect Biol 2010;2:a000414</a> <b>Article 3:</b> <a href="#">TRENDS in Microbiology Vol.11 No.4 April 2003</a>

<b>Lecture 3</b> Sep 13 <sup>th</sup>	Quantification and Sampling Methods in Marine Microbiology		<b>Video links:</b> Video#9-12	<b>Article 4:</b> <a href="#">HOLGER W. et al., 1959. Bacterial Populations in sea water</a>  <b>Article 5:</b> <a href="#">Lamb et al., Science 355, 731–733 (2017) 17 February 2017</a>
<b>Lecture 4</b> Sep 15 <sup>th</sup>	Bacterial characterization and identification			<b>Article 6:</b> <a href="#">Improved characterization of Marine Bacteria</a>
<b>Lecture 5</b> Sep 20 <sup>th</sup>	Microbial Genomics	<b>II. Microbial Marine Diversity</b>	<b>Video links:</b> Video#13-17  <b>Article 7:</b> <a href="#">Current Biology 27, R431–R510, June 5, 2017</a>	<b>Chapter 17 book</b>
<b>Lecture 6</b> Sep 22 <sup>th</sup>	Microbial Diversity		<b>Article 8:</b> <a href="#">Current Biol Protists</a>	
<b>Test 1</b> Sep 27 <sup>th</sup>	Test 1 (20%)	<b>Lectures 1-6</b>	Articles for oral presentations will be assigned	
<b>Lecture 7</b> Sep 29 <sup>th</sup>	Introduction to bacterial genetics	<b>III. Microbes and their role in the ocean</b>	<b>Chapters 4, 14, 17-22 book</b>	
<b>Lecture 8</b> Oct 4 <sup>h</sup>	Bacterial evolution and horizontal gene transfer			
<b>Lecture 9</b> Oct 6 <sup>th</sup>	Microbial physiology and metabolism			<b>Article 9:</b> <a href="#">NATURE REVIEWS   MICROBIOLOGY VOLUME 12   APRIL 2014   263</a>
Oct 11 <sup>th</sup>				
<b>Lecture 10</b> Oct 13 <sup>th</sup>	Microbial biogeochemical cycles			<b>Article 10:</b> <a href="#">Frias-Lopez et al. PNAS March 11, 2008 vol. 105 no. 10 3807</a>
<b>Lecture 11</b> Oct 18 <sup>th</sup>	Viruses in the ocean			<b>Article 11:</b> <a href="#">NATURE   Vol 437   15 September 2005   doi:10.1038/nature04160</a>  <b>Article 12:</b> <a href="#">Viruses 2017, 9, 302; doi:10.3390/v9100302</a>

Test #2 Oct 20 <sup>th</sup>				
Lecture 13 Oct 25 <sup>th</sup>	Host-pathogen interaction	<b>III. Microbial Pathogenesis in Marine Environments</b>	<b>Chapters 25-27</b>	
Lecture 14 Oct 27 <sup>th</sup>	Introduction to the immunology of aquatic organisms			
Lecture 15 Nov 1 <sup>th</sup>	Marine Diseases			<b>Article 13:</b> <a href="#">Kotob et al. Vet Res (2016) 47:98</a>
Lecture 16 Nov 3 <sup>th</sup>	Microbiome and Beneficial microbes	<b>IV. Marine microbial biotechnology</b>		
Lecture 17 Nov 8 <sup>th</sup>	Fish Vaccinology		<b>Chapter 27 book</b>	<b>Article 14:</b> REVIEWS IN FISHERIES SCIENCE & AQUACULTURE <a href="http://dx.doi.org/10.1080/23308249.2016.1261277">http://dx.doi.org/10.1080/23308249.2016.1261277</a>
Nov 10 <sup>th</sup>	Antibacterial agents and bacterial resistance		<b>Chapter 16 book</b>	
Nov 15 <sup>th</sup>	Marine Fungi			<b>Article 15:</b> <a href="#">Marine fungi</a>
<b>Test #3 Nov 17<sup>th</sup></b>	<b>Test 3 (20%)</b>	<b>Lectures 17-20</b>		
<b>Oral presentations Nov 22<sup>nd</sup></b>	Oral presentations		Participation will be considered (e.g., questions)	
<b>Oral presentations Nov 24<sup>nd</sup></b>	Oral presentations			
<b>Oral presentation Nov 29<sup>nd</sup></b>	Oral presentations			
December (4-13) TBD	Comprehensive Final Exam (25%)	<b>All lectures and oral presentations</b>		

**Format:** 2 lecture periods of 1 h 15 min per week

**Suggested Reading:** The article listed will be available in the d2l portal. These reading are only suggested to expand the student knowledge. Additional reading

will be assigned to each lecture from the requested reference book ([https://www.slideshare.net/jimmyliang313/microbiology-an-evolving-science-3rd-edition?from\\_action=save](https://www.slideshare.net/jimmyliang313/microbiology-an-evolving-science-3rd-edition?from_action=save)).

### **Evaluations.**

- Test 1 (20%)
- Test 2 (20%)
- Test 3 (20%)
- Oral presentation (10%)
- Participation and critics (5%)
- Final Comprehensive Exam (25%)

**Tests (20% each, total 60%):** The student will be evaluated in three different aspects, including fundamental concepts, contextualization of the concept, and application of the learned concepts. Advice to prepare the tests will be provided.

**Oral presentation (10%):** Students prepare and deliver a slideshow covering the methods, results, and interpretation of specific assigned article. Advice to create efficient slideshows will be provided. The format will be 8 min presentation 2 min questions.

**Participation (5%):** Students are expected to participate actively in all aspects of the course. Every student is assessed continuously throughout the course on his/her level of involvement, from the sharing of ideas and opinions during discussions to the general attitude and level of preparation before and during class and oral presentations.

**Comprehensive final exam (25%):** The format of the final exam will no differ from the regular tests, however all the lectures and oral presentations will be evaluated. Advice to prepare the tests will be provided.

### **Bibliography (the books listed will be placed on reserve at the library)**

Microbiology: An Evolving Science: Joan L Slonczewski, John W Foster: 9780393123678  
Book will be provided (see previous link)

### **ATTENDANCE AND PARTICIPATION**

Regular attendance and class participation are expected of all students. An important component of your final grade will be an assessment of your active class participation in a variety of dynamic learning exercises throughout the semester. This includes assessment of student's ability to critically analyze and interpret published scientific literature. Excessive absences and/or a lack of active participation could result in a lower course grade. Should a student miss a class, it is that student's responsibility to obtain notes from another classmate. Work-related absences, etc., are not a legitimate excuse for missing class. Absent students can NOT make up daily in class performance-based assessment points.

If you miss an exam because of an *excused* absence you will be allowed to make up the exam but ONLY IF YOU MEET THE CRITERIA of the School. There are NO makeups for exams missed due to unexcused absences.

### **PLAGIARISM**

As outlined in Section 4.12.4 of MUN's Calendar, plagiarism (the act of presenting the ideas or works of another as one's own) is a form of academic offence. Plagiarism will not be tolerated in this course. Any student who plagiarizes another's work exposes himself/herself to the disciplinary measures outlined in section 4.12 of MUN's Calendar, which includes course expulsion. We will provide clear guidelines on how to avoid this problem.

### **EQUITY, ACCESSIBILITY AND COLLABORATION.**

Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities ([www.mun.ca/policy/site/policy.php?id=239](http://www.mun.ca/policy/site/policy.php?id=239)). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre at the earliest opportunity ([www.mun.ca/blundon](http://www.mun.ca/blundon)).

### **MISCONDUCT (UNIVERSITY REGULATION 6.12).**

Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.