

Horizontal Gene Transfer, from mechanisms to outcomes: MCB 5896
Fall, 2020
Instructor: Dr. Thane Papke
T/Th 12:30-1:45 OAK 104

Credits: 3

Description: Readings from the scientific literature will provide a focus for investigating how quorum sensing, natural transformation and biofilm formation are interwoven characteristics that collectively provide a controlled and biased process for the horizontal gene exchange in Prokaryotes. Then, gene exchange will be discussed for understanding how this process contributes uniquely to prokaryotic evolution (e.g., via adaption to environments, generation of metabolic pathways and how they form separate lineages).

Contact Info:

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Office Hours:

After class, and by appointment.

Course Objectives:

Prokaryotes generate diversity and evolve mainly through Horizontal Gene Transfer. In order to gain a deeper appreciation for prokaryote evolution, and how they adapt to their environment, we will examine the scientific literature demonstrating mechanisms and strategies for gene exchange, as well as the outcomes.

Course goal:

To develop intellectual skills that enable students to synthesize facts, principles, and logic that allows understanding the role of microorganisms in our world. To develop skills and gain confidence in communicating through oral presentations.

NO TEXTBOOK! Each student is responsible for finding the article. All articles are available and free from the Internet, if using a computer on campus. If off campus, you can still get it for free, but you have to sign into the library.

Grades:

Participation: Students are required to come to class prepared to discuss the assigned reading! There will be an open-ended discussion about the reading material. Each student is expected to participate voluntarily every day. **Additionally,** each student will present the assigned reading and lead the discussion during at least 2 class periods.

Presentation: Each student will make a 30-minute PowerPoint presentation (approximately 30 slides). Learning to give oral presentations is an important aspect of this class, and an applicable life-long skill for all scientists.

Breakdown of final grade: Participation 50%; Presentation 50%

Grading Scale:

Grade	Letter Grade	GPA
97-100	A+	4.3
93-96	A	4.0
90-92	A-	3.7
87-89	B+	3.3
83-86	B	3.0
80-82	B-	2.7
77-79	C+	2.3
73-76	C	2.0
70-72	C-	1.7
67-69	D+	1.3
63-66	D	1.0
60-62	D-	0.7
<60	F	0.0

Reading Topics:

Week 1: Quorum Sensing

Week 2: Biofilms

Week 3: Natural transformation, the basics

Week 4: Links between quorum sensing, biofilms and natural transformation in the Gram positive genus *Streptococcus* spp.

Week 5: Links between quorum sensing, biofilms and natural transformation in the Gram negative species *Vibrio cholerae*.

Week 6: Archaeal mechanisms of gene transfer

Week 7: Cooperation in prokaryotes, via quorum sensing and HGT.

Week 8: Impact of horizontal gene transfer on the formation of species.

Week 9: Impact of horizontal gene transfer on adaptation to environments

Week 10: Impact of horizontal gene transfer on the creation of metabolic pathways

Week 11: Student presentations

Week 12: Thanksgiving break

Week 13: Student presentations

Week 14: Student presentations

Important Dates

Week 6: Student meetings to discuss presentation. Student must meet with Dr. Papke at a scheduled time to discuss topic of presentation. Bring with you two review articles, and three primary literature articles on the topic.

Week 9: 1st round of student practice talks. Must meet with Dr. Papke, to go over your Power Point presentation: bring with you your draft presentation, and be prepared to present and discuss it.

Topics for presentations:

- 1) Viruses evolution/ecology and recombination
- 2) Photosynthesis
- 3) Sulfur cycle
- 4) CO₂ fixation pathways
- 5) Rhodopsins
- 6) Nitrogen cycle
- 7) Origins of life
- 8) Origins of Eukaryotes

Each student is expected to abide by the University of Connecticut Code of Conduct. We are all here to learn and to be excited about learning.

Plagiarism:

In the past there have been misunderstandings about whether it is appropriate to copy material from references or from other students. Briefly, it is never appropriate to copy anything written by someone else: neither students, published works, dissertations, nor internet material. The work you turn in must be in your own words. Do not copy anything from work written by others. If you must quote from written work (and this is rarely done in scientific work), the passage that is quoted must be enclosed in quotation marks and followed immediately by the

reference citation. All facts and interpretations of facts that are not your own must include a literature citation. When describing factual material, you should restate it in your own words. If you want to include tables of data or diagrams from the literature, you may do so as long as you cite the appropriate reference in the legend to the figure or table. All the references in your reference list should be cited in your work. Do not cite sources from which you did not use information.

Excerpt from the Student Conduct Code (<http://www.dosa.uconn.edu/scc11.html>)

If you have any questions about the acceptability of your work regarding plagiarism, contact Dr. Papke before submitting the work. After you submit the work it is too late and any violations of this policy will be dealt with according to the guidelines given in Section XI of the *Student Conduct Code* (see below).

You are recommended to check your own papers for plagiarism with freely available on line plagiarism detection software. Here are some example urls:

<http://www.dustball.com/cs/plagiarism.checker/>

<http://www.plagiarismchecker.com/>

<http://www.plagtracker.com/>

<http://plagiarisma.net/>

http://www.grammarly.com/?q=plagiarism&gclid=CJvHkL_IiLICFcXb4Aod0HYAcw

Academic Misconduct

A fundamental concept of all educational institutions is academic honesty. All academic work depends upon respect for and acknowledgment of research and ideas of others. Misrepresentation of someone else's work as one's own is a most serious offense in any academic setting.

No academic misconduct, including any forms of cheating and plagiarism, can be condoned. Academic misconduct includes but is not limited to providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation including papers, projects, and examinations; attempting to influence one's academic evaluation for reasons other than academic achievement or merit; presenting, as one's own, the ideas or words of another for academic evaluation without proper acknowledgment; doing unauthorized academic work for which another person will receive credit or be evaluated; and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

Also, one is not allowed to cooperate or be an accessory to another's academic misconduct. Thus a student who writes a paper or does an assignment for another student is an accomplice and must be held accountable just as severely as the other. It is perhaps less obvious, but it is equally logical, that a student who knowingly permits another to copy from his or her own paper, examination, or project should be held as accountable as the student who submits the copied material.

Details of the proceedings involved in academic misconduct cases are provided on the web site <http://www.dosa.uconn.edu/scc11.html>.