Syllabus
Microbial Genetics and Biotechnology
MB 456/556

Winter term 2016
MWF 9:00-9:50 AM
Nash Hall 204

Instructors:
Bruce Geller.  Office: 434 Nash Hall.  Hours: MH 10:00-11:00.  Tel: 737-1845.  gellerb@orst.edu
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Prereq:  MB302, BB350 (or 450), BB351 (or 451)
Coreq:   MB310

This text is available free of charge through the Valley Library

Learner Outcomes
Upon completion of this course, a student will

Mb 456
• Compare and contrast mobile genetic elements
• Use vocabulary relevant to bacterial mobile genetic elements
• Demonstrate in writing the knowledge and vocabulary acquired in the reading and lectures
• Read articles from professional journals and be able to communicate orally and in writing
  the journals’ findings
• Interpret data from experiments presented in the reading assignments and lectures.

Mb 556
• Same as above, plus one of the following:
• Design a recombinant genetic element that can be used to solve a specific biological
  problem and write a research proposal to solve a specific biological problem, or:
• Review the literature on a specific mobile genetic element and critically analyze the data
  that are used to support the conclusions reached by the authors of the literature reviewed.

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<tr>
<th>Date</th>
<th>Day</th>
<th>Topic</th>
<th>Reading Assignment</th>
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MGB4 p 17-26, 31-34, 183-187, 189-193, 194 (last parag)-197  
| Jan 6 | W  | Plasmid Replication. Iteron plasmids, | MGB3 p 219-222.  
MGB4 p 199-203 (1st parag)  
Jan 8 F  **Plasmid Replication.**
Rolling circle plasmids.  MGB3 p 202-4.
MGB4 p 187-189

Jan 11 M **Partitioning.**
**Incompatibility.**
MGB3 p 207-209, 223.
MGB4 p 193-194, 204.

Jan 13 W **Recombination**
MGB3 p 429-446. MGB4 p 403-416.

Jan 15 F **Insertion sequences and transposons.** Tn10, Tn3.
Conservative and replicative transposition
Weigel et al 2003 Science 302:1569-71

Jan 18 M **MLK Holiday. NO CLASS.**

Jan 20 W **Transposons and Integrons.**
Tn5 and Tn21.
MGB3 p 395-397, 399 (regulation)-400, 412-414 (Tn21).
MGB4 p 376-378, 380 (regulation)-382

Jan 22 F **Exam I**

Jan 25 M **Natural Competence.**
**Transformation.**
(Ream)
MGB3 p 277-292.
MGB4 p 247-263.
Science 310:1824-7 (plus supplemental section) & 1775-7 (2005)

Jan 27 W **Conjugation.**
**Horizontal gene transfer.**
Agrobacterium tumefaciens.
(Ream)
MGB4 Box 5.1 (p230-232), p 600 (T4S)  MGB3 Box 5.1 (p 253-7), p 627-8 (T4S).
Ream. 2009. Microb Biotech

Jan 29 F **CRISPR/cas**
(Ream)

Feb 1 M **Diversity-generating retroelements**
Liu et al. 2002 Science 295:2091-4
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<tr>
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<td>Jones et al. 2005 Mol. Ther. 11:687-94</td>
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<td>Feb  8 M</td>
<td><strong>Bacterial speciation: what is a bacterial species?</strong></td>
<td>MGB3 p 51-3, Box 2.7 (p 125-130), Box 8.1 (p 354), Box 8.3 (p 365).</td>
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<td>(Dreher)</td>
<td>MGB4 p 50-51, Box 2.5 (p 110-114), Box 8.1 (p 336), P 349-350.</td>
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<td>Feb 10 W</td>
<td><strong>Attenuation</strong></td>
<td>MGB3 p 530-538. MGB4 p 498-505.</td>
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<td><strong>Riboswitches.</strong></td>
<td>Breaker. 2010. CSH Persp Biol.</td>
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<td>Feb 15 M</td>
<td><strong>Exam 2</strong></td>
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<td>Feb 19 F</td>
<td><strong>Expression plasmids</strong></td>
<td>MGB3 p 123-125, 298. MGB4 p 62, 211-212, 273. Qiagen Manuals</td>
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<td>pET, His-tag. Gateway vectors.</td>
<td>Invitrogen web pages</td>
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2-hybrid system.

Feb 26 F  Genome Editing.  Hu et al., 2014. PNAS 111:11461.
Molecular DNA surgery with CRISPR/cas

Feb 29 M  Phage display.  PDPP p 1-4, 9, 21-42.

Inverse PCR  MGB3 p 403-405, 407.
MGB4 p 385-387.
TnPhoA  MGB3 p 621-622
MGB4 p 594-595.

In vivo expression technology (IVET).
Lactobacillus  Bron et al. 2004 J Bact 186:5721-9


Mar 9 W  Graduate student presentations.

Mar 11 F  Review for Final Exam.

Mar 17  Thursday  Final Exam  14:00 (2:00 PM)  Nash Hall 204
Projects
A written project and oral presentation are REQUIRED for all students enrolled in MB 556. Students enrolled in MB 456 are NOT required to do a project or present, but are required to attend the presentation by students in 556. Students in MB 556 may chose between writing a review paper or a research proposal. The topic or the project must be related to microbial genetics.

All students enrolled in MB556 must meet with Dr. Geller and discuss plans for their term project. Please schedule a meeting early in the term (1st couple of weeks) to receive specific instructions on your concept, organization of writing, and expectations.

Reviews must include descriptions of experiments and results, and a critical analysis of the conclusions presented by the authors of the experiments cited. Credit is given for suggestions for follow-up experiments.

Research proposals present a plan of experiments to investigate an hypothesis. The proposal must be centered on a microbial molecular genetic approach. The project must include appropriate background information, describe the problem it attempts to answer, and specify details of the tactics and strategy being proposed. Credit is given for discussing potential drawbacks or shortcomings of the proposal and alternative strategies.

Each student enrolled in MB556 will present their project to the class during the last week of the course. All presenters are required to provide either a paper copy handout or an electronic file that outlines their presentation and includes any graphics that are used during the presentation. Limit of 7 pages, single-spaced (not including figures). Grading will be 10% of the final grade.

Exams
There are 3 exams. Each exam has 100 points. Exams require you to write short, written answers. Each exam covers only material since the previous exam. Students registered for MB 556 will be graded on a different scale than those registered for 456.

University and Departmental Policies:
For students with documented disabilities: "Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."

Please note: The Department of Microbiology follows the university rules on civility and honesty. These can be found at http://oregonstate.edu/studentconduct/regulations/index.php#acdis. Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action. Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations.