COURSE: BIOL 341 - Microbial Processes in Engineering and Natural Sciences  
(Microbiology for Engineers)

ACADEMIC TERM: FALL 2009

MEETINGS: MWF 11:00 – 11:50 AM, C303

INSTRUCTOR: Dr. Rajesh K. Sani, Assistant Professor  
Office Hour: Afternoon open door and by appointment, McLaury Rm 103  
Phone: 605-394-1240, e-mail: rajesh.sani@sdsmt.edu

COURSE DESCRIPTION:  
Biology will define scientific progress in the 21st century - The Biotech Century (National Academy of Engineering). Today most of the processes used for energy generation, food processing, pollution control, site remediation rely on not only physical/chemical reactions but also on biological reactions. Therefore this course is designed to provide a basic knowledge on microbiology, biochemistry, genetic engineering that is directly applicable to engineering and related science fields.

COURSE PREREQUISITES: None

DESCRIPTION OF INSTRUCTIONAL METHODS:  
The course comprises of lectures, discussions, and will include active, collaborative, and problem-based learning techniques (e.g., one minute paper, brainstorm applications of class material, summarize/clarify lecture notes generation of test questions or homework problems from lecture material). Lecture outlines (in PDF) and supplementary materials will be posted at the course website. Students should read relevant material in the textbook and outlines prior to attending class. Questions about recent lectures will be asked during class. Students are expected to participate in answering questions.

COURSE REQUIREMENTS:  
Required Text: Microbiology  
ISBN: 0072992913  
Available at Tech Bookstore

Text website:  

Additional Materials:  
3. Search for up-to-date information on lecture topics from the web pages is recommended  

Attendance: To achieve success in this course, regular attendance is strongly recommended.
Academic dishonesty: All students are expected to be familiar with the student code of conduct. Regulations regarding academic integrity are described in Board of Regents Policy 3-4 (http://www.sdbor.edu/policy/policy.htm). Acts of dishonesty in class activities include cheating in exams, quizzes, and homework problems. Appropriate penalties may include retaking the examination, reduction of grade, or discharge from class.

Make-up Policy: Students are required to take exams at the scheduled time. Make-up exams can be arranged for students participating in institution-sponsored activities. In this case, the exam should be taken prior to the scheduled time, and arrangements to take the exam should be made one week prior to scheduled exam.

COURSE GOALS:
• To introduce the principles of microbiology - basic chemistry, cell structure/function, and cell growth,
• To introduce basic laboratory techniques in microbiology, biochemistry, genetic engineering.
• To specify the role of microorganisms in biogeochemical cycling in ecosystems,
• To apply engineering principles to biological processes,
• To recognize current trends in biotechnology in response to current demands from various sectors of industry.

Department Programmatic Objective Met:
• Apply a fundamental knowledge, and practical understanding, of chemical engineering principles (ABET – a,c,k).
• Incorporate technical and non-technical issues in problem solving (ABET - e).

OUTCOMES:
After completion of this course, students will be able to:
• Describe powerful biological techniques including microbiology, biochemistry, genetic engineering,
• Communicate with microbiologists and biochemists about the fundamental properties of microorganisms and enzymes,
• Apply engineering principles (kinetics, reactor design, mass transfer) to biological processes,
• Recognize roles of engineers in biotechnology.

EVALUATION PROCEDURES:
Mid-term and final examinations, homeworks, and quizzes are planned. No excuses for missed quizzes and exams will be accepted other than certified medical excuses. The approximate contribution to the term grade is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework (5-7)*</td>
<td>150</td>
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<tr>
<td>Quizzes (6)</td>
<td>50</td>
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<tr>
<td>Mid-term Exam</td>
<td>100</td>
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<tr>
<td>Final Exam</td>
<td>100</td>
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<td>Total</td>
<td>400</td>
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*Homework is due in class. Use engineering or plain paper, one side of each page. Put your name at the top right corner of the first page and staple it at the top left corner (Do not fold). Late homework will not be accepted unless it is arranged with me in advance.

FREEDOM IN LEARNING:
Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be
evaluated solely on an academic basis and students should be free to take reasoned exception to
the data or views offered in any course of study. Students who believe that an academic
evaluation is unrelated to academic standards but is related instead to judgment of their personal
opinion or conduct should contact the dean of the college which offers the class to initiate a
review of the evaluation.

ACADEMIC INTEGRITY:
All students are expected to read and follow the policy governing academic integrity section in
the SDSM&T catalog that explains the importance of academic honesty and intellectual integrity
(BOR Policy 3.4.2.B.1). Acts of dishonesty include cheating in exams and assignment problems
and fraud or plagiarism in reports and review papers. Appropriate penalty such as retaking the
exam, reduction of grade, or discharge from the class may be given to the individual who
violates.

CAMPUS AMERICANS WITH DISABILITY ACT (ADA) POLICY:
Students with special needs or requiring special accommodations should contact the instructor,
Dr. Sani, at 394-1240 and/or the campus ADA coordinator, Ms. Jolie McCoy, at 394-1924 at the
earliest opportunity.

TENTATIVE SCHEDULE:
Note: Topics indicated below are for guide purpose only. They may take longer or less time to cover.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topic</th>
<th>Reading</th>
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<tbody>
<tr>
<td>1</td>
<td>Sep 2 to 4</td>
<td>Introduction, Impacts, Needs</td>
<td>Supplemental Text*</td>
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<td>2 – 5</td>
<td>Sep 9 to 30</td>
<td>Introduction to Microbiology</td>
<td>Chapters 1 to 7</td>
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<td>Microbial Nutrition and Growth</td>
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<td>Control of Microbial Growth</td>
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<td>6 – 8</td>
<td>Oct 2 to Oct 23</td>
<td>Microbial Metabolism</td>
<td>Chapters 8 to 10</td>
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<td>Oct 28</td>
<td>MIDTERM EXAM (All topics covered till Oct 23)</td>
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<tr>
<td>9 – 12</td>
<td>Oct 30 to Nov 20</td>
<td>Microbial Molecular Biology and Genetics</td>
<td>Chapters 11 to 15</td>
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<td>DNA Technology and Genomics</td>
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<td>12 – 14</td>
<td>Nov 23 to Dec 2</td>
<td>The Diversity of the Microbial World</td>
<td>Chapters 19</td>
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<td>14 – 15</td>
<td>Dec 4 to Dec 11</td>
<td>Food and Industrial Microbiology</td>
<td>Chapters 40, 41</td>
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<td>16</td>
<td>December 17 (10 - 11:50 AM)#</td>
<td>FINAL EXAM [Topics Though Midterm 30% and After Midterm 70%]</td>
<td>GOOD LUCK!</td>
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*Note: Supplemental texts will be provided by the instructor.
# http://sdmines.sdsmt.edu/cgi-bin/global/a_bus_card.cgi?SiteID=419898


Finally: Suggestions for improvements to class format, teaching style, or content are highly welcomed!