CURRICULUM COMMITTEE CHECKLIST

NAME OF PROGRAM: Biology
Date: 4/2/12

Step 1 Reviewed change at division meeting. via e-mail

Step 2 Presented as informational item at Division Chair Meeting(s) and checked if it affects other departments. Like programs must meet with Division Chairs on all affected campuses (North Mankato and Faribault).

Division Chair’s signature: N/A

Step 3 Instructional Dean reviewed and indicated need for Curriculum Committee approval.

Instructional Dean’s signature: [Signature]

Step 4 Advisory Committee approval indicated in meeting minutes if necessary. Minutes provided to Curriculum Committee.

Step 5 Curriculum Committee made recommendations (changes, additional approvals, etc.). If no, skip to Step 7.

Step 6 Committee’s recommendations completed. (Skip if not applicable.)

Step 7 Curriculum Committee approved.

Curriculum Committee Chair’s signature: [Signature]

Step 8 Minutes and necessary materials provided to VP of Academic Affairs.

Step 9 Vice President of Academic Affairs approved.

Vice President of Academic Affairs’ signature: [Signature]

Step 10 New Course Maximum Enrollment to Shared Governance.

Step 11 President’s approval for all changes requiring MnSCU approval.

President’s signature: [Signature]
## Appendix A

### New Course or Course Change Proposal Form

<table>
<thead>
<tr>
<th>Date of Proposal:</th>
<th>March 26, 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author:</td>
<td>Renee J Krohne Guyer</td>
</tr>
<tr>
<td>Proposal Type:</td>
<td>New Course</td>
</tr>
<tr>
<td>Contact for the Course:</td>
<td>Renee J Krohne Guyer</td>
</tr>
<tr>
<td>Course Designator, Number and Title: (i.e.: ACCT 1800, Business Law)</td>
<td>BIOL270 Microbiology</td>
</tr>
<tr>
<td>Number of Credits:</td>
<td>4 credits</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>CHEM108 OR CHEM120 OR BIOL225</td>
</tr>
</tbody>
</table>

**Course Description:** This course is an introduction to the general principles and methods used in the study of microorganisms. It includes a survey of prokaryotic and eukaryotic microorganisms emphasizing bacteria and viruses. Topics include microbial cell structure and function, metabolism, microbial genetics, and the role of microorganisms in disease, immunity, and other selected applied areas. Laboratory techniques include isolating, culturing, and identifying microorganisms. (MNTC 3). Prerequisites include CHEM108 Introduction to Chemistry OR CHEM120 Principles of Chemistry I OR BIOL225 Anatomy and Physiology I.

<table>
<thead>
<tr>
<th>Grading Method:</th>
<th>Grade</th>
<th>X</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling:</td>
<td>Fall</td>
<td>X</td>
<td>Spring</td>
</tr>
<tr>
<td>Instructional Type:</td>
<td>Lecture</td>
<td>Lab</td>
<td>Lecture/Lab</td>
</tr>
<tr>
<td>Class Maximum:</td>
<td>48 lecture (24 lab)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is this Course Proposed as a Liberal Arts and Sciences Course: Yes X No

If Yes, Which MnTC Area/Areas ([http://www.mntransfer.org](http://www.mntransfer.org)) Will it Fulfill?

Goal Area 3: Natural Sciences
<table>
<thead>
<tr>
<th>Is This Course a Requirement/Elective for a Specific Program or Programs?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>If So, Which Program(s)?</td>
<td>Requirement for: A.S. in Nursing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective for: A.S. in Biology</td>
<td></td>
</tr>
</tbody>
</table>

Describe What is Changing/Being Added, and the Rationale:

CHEM120 is being added as an optional prerequisite because Biology A.S. students are required to take CHEM120 but not CHEM108. CHEM108 and BIOL225 should remain as pre-requisites as CHEM108 is the chemistry nursing students MAY take and BIOL225 is a required Biology course for nursing A.S. students.

What Impact Will This New Course or Change Have on Other Programs or Areas?

This will allow more flexibility in curriculum options for students.

➢ Attach Common Course Outline to this Form
BIOL270 Microbiology
Course Outcome Summary

Course Information
Organization: South Central College
Developers: Renee J Krohne
Revised Date: 3/26/2012
Course Number: BIOL270
Potential Hours of Instruction: 80
Total Credits: 4

Description
This course is an introduction to the general principles and methods used in the study of microorganisms. It includes a survey of prokaryotic and eukaryotic microorganisms emphasizing bacteria and viruses. Topics include microbial cell structure and function, metabolism, microbial genetics, and the role of microorganisms in disease, immunity, and other selected applied areas. Laboratory techniques include isolating, culturing, and identifying microorganisms. (MNTC 3). Prerequisites include CHEM108 Introduction to Chemistry OR CHEM120 Principles of Chemistry I OR BIOL225 Anatomy and Physiology I.

Types of Instruction
Instruction Type | Contact Hours | Credits
--- | --- | ---
Lecture | 48 | 3
Lab | 32 | 1

Prerequisites
CHEM 108 Introduction to Chemistry or CHEM 120 Principles of Chemistry I or BIOL225 Anatomy and Physiology I

Exit Learning Outcomes
Core Abilities
A. Foundations and skills for lifelong learning
B. Teamwork and problem-solving
C. Analysis and inquiry
D. Critical and creative thinking
E. Written and oral communication

External Standards
Minnesota Transfer Curriculum Area 3: Natural Sciences
Goal: To improve students' understanding of natural science principles and of the methods of scientific inquiry, i.e., the ways in which scientists investigate natural science phenomena. As a basis for lifelong learning, students need to know the vocabulary of science and to realize that while
a set of principles has been developed through the work of previous scientists, ongoing scientific inquiry and new knowledge will bring changes in some of the ways scientists view the world. By studying the problems that engage today's scientists, students learn to appreciate the importance of science in their lives and to understand the value of a scientific perspective. Students should be encouraged to study both the biological and physical sciences. Students will be able to:

- Demonstrate understanding of scientific theories.
- Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
- Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

### Competencies

1. **Distinguish between the major classes of microorganisms and understand their respective characteristics.**
   - **Learning Objectives**
     a. Distinguish between bacteria, viruses, protozoa, algae, and fungi.
     b. Recall the general properties of bacteria.
     c. Recall the general properties of viruses.
     d. Recall the general properties of protozoa.
     e. Recall the general properties of algae.
     f. Recall the general properties of fungi.
     g. Compare and contrast the major categories of microbes.
     h. Identify and explain which types of microbes are most medically relevant.

2. **Use the terminology of cell structure and function, cell reproduction, and microbial taxonomy.**
   - **Learning Objectives**
     a. Identify the components of a Gram negative cell wall.
     b. Identify the components of a Gram positive cell wall.
     c. Identify the components of an Acid fast cell wall.
     d. Compare and contrast the various types of bacterial cell wall including Gram positive, Gram negative, and Acid Fast cells.
     e. Identify the major internal cellular structures of a prokaryotic cell.
     f. Compare and contrast prokaryotes and eukaryotes in terms of cell structure and function.

3. **Explain microbial genetics including the cause, consequences, and uses of mutations.**
   - **Learning Objectives**
     a. Explain the steps involved in DNA replication.
     b. Identify point and frameshift mutations, their causes, and their potential consequences.
     c. Describe horizontal gene transfer as it occurs in bacteria including conjugation, transduction, and transformation.

4. **Explain genetic engineering and its applications.**
   - **Learning Objectives**
     a. Define genetic engineering.
     b. Explain various applications of genetic engineering being used in contemporary society.
     c. Interpret a journal article related to genetic engineering.
     d. Evaluate genetic engineering from a natural science perspective and ask questions about...
5. Identify the major types of antimicrobial drugs and explain their modes of action.

   Learning Objectives
   a. Explain inhibition of cell wall synthesis
   b. Explain inhibition of protein synthesis
   c. Explain disruption of membrane function
   d. Explain action as an antimetabolite
   e. Explain inhibition of nucleic acid synthesis
   f. Identify groups of antibiotics which inhibit cell wall synthesis
   g. Identify groups of antibiotics which inhibit protein synthesis
   h. Identify groups of antibiotics which disrupt cell membrane function
   i. Identify groups of antibiotics which act as antimetabolites
   j. Identify groups of antibiotics which inhibit nucleic acid synthesis
   k. Describe possible adverse effects of antibiotic therapy.

6. Explain terminology and basic principles of epidemiology.

   Learning Objectives
   a. Define epidemiology
   b. Distinguish between sporadic disease, epidemics and pandemics
   c. Relate portals of entry and exit to modes of disease transmission
   d. Distinguish between modes of disease transmission including direct contact transmission, vertical transmission, indirect contact transmission, transmission via vehicles and transmission via vectors.
   e. Differentiate between descriptive, analytical and experimental epidemiologic studies
   f. Distinguish between common-source outbreaks and propagated epidemics.
   g. Describe methods of disease control including isolation, quarantine and vector control.
   h. Identify nosocomial infections and identify means to prevent and control nosocomial infections

7. Demonstrate understanding of terminology and basic principles of immunology.

   Learning Objectives
   a. Identify the types of cells involved in the immune system
   b. Identify the role of the various cells involved in the immune system
   c. Explain and provide examples of innate immunity
   d. Explain and provide examples of adaptive immunity
   e. Explain and provide examples of cell mediated immunity
   f. Explain and provide examples of humoral immunity
   g. Compare and contrast the various types of immunity

8. Explain the roles that components of the immune system play in preventing and occasionally causing disease.

   Learning Objectives
   a. Define and provide examples of Immediate/Type I Hypersensitivity
   b. Define and provide examples of Immediate/Type II Hypersensitivity
   c. Define and provide examples of Immediate/Type III Hypersensitivity
   d. Define and provide examples of Immediate/Type IV Hypersensitivity
   e. Define and provide examples of an autoimmune disease
   f. Explain how the immune system causes an autoimmune disorder
g. Describe examples of autoimmune disorders including lupus and rheumatoid arthritis

9. **Identify infectious diseases including the causative agent and its characteristics, modes of transmission, signs and symptoms as well as treatment of the disease.**
   Learning Objectives
   a. Identify infectious diseases of the skin and eyes including wounds and bites
   b. Identify urogenital and sexually transmitted diseases caused by microbes
   c. Identify diseases of the respiratory tract caused by microbes
   d. Identify diseases of the oral cavity caused by microbes
   e. Identify diseases of the gastrointestinal tract caused by microbes
   f. Identify cardiovascular, lymphatic and systemic diseases caused by microbes
   g. Identify diseases of the nervous system caused by microbes
   h. Integrate course themes as they related to infectious diseases.

10. **Demonstrate technical laboratory skills such as microscopy, bacterial cell staining, aseptic techniques, culturing and isolation.**
    Learning Objectives
    a. Use a bright field microscope to view and interpret slides
    b. Prepare microscope slides for microbiological examination
    c. Perform and interpret a Gram's Stain
    d. Perform and interpret an Endospore Stain
    e. Demonstrate proper use of aseptic techniques for the transfer and handling of microorganisms

11. **Demonstrate proper handling of infectious and biohazardous waste in the laboratory setting.**
    Learning Objectives
    a. Demonstrate the proper disposal of contaminated lab materials
    b. Demonstrate the proper disposal of broken glassware
    c. Demonstrate the proper clean up procedure upon finishing a laboratory exercise

12. **Each student individually will apply staining and metabolic tests to characterize and identify unknown bacteria.**
    Learning Objectives
    a. Interpret a dichotomous key
    b. Perform the appropriate staining technique(s) to an unknown culture
    c. Identify and use appropriate microbiological media and test systems to identify the species of an unknown bacterial organism
    d. Write the results of the experiment in a laboratory report.

13. **Enumerate the number of microbes in a sample.**
    Learning Objectives
    a. Determine the most appropriate means of enumerating the number of microbes based on the type of sample
    b. Choose and use the appropriate pipetting device
    c. Calculate the number of microbes based on plate counts and serial dilutions

14. **Evaluate the effectiveness of antimicrobials.**
    Learning Objectives
    a. Describe the Kirby Bauer method of determining microbial sensitivities.
    b. Perform a Kirby Bauer test
    c. Interrupt zones of inhibiton and determine the level of microbial sensitivity.