WTCS Repository

10-806-197 Microbiology

Course Outcome Summary

Course Information

Description Examines microbial structure, metabolism, genetics, growth and the relationship between humans and microbes. Addresses disease production, epidemiology, host defense mechanisms and the medical impact of microbes. Presents the role of microbes in the environment, industry, and biotechnology.

Total Credits 4.00

Pre/Corequisites

Prerequisite Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College.

Course Competencies

1. Explore the history and scope of the field of microbiology

Assessment Strategies

1.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
1.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

1.1. written, graphic or oral assessment strategy describes the range of organisms studied by microbiologists
1.2. written, graphic or oral assessment strategy relates historical events to the current understanding of microbiology
1.3. written, graphic or oral assessment strategy evaluates the relationship between humans and microbes
1.4. written, graphic or oral assessment strategy describes the scope of microbes within industrial and environmental applications
1.5. written, graphic or oral assessment strategy uses correct writing conventions of binomial nomenclature
1.6. written, graphic or oral assessment strategy describes classification methods used for grouping organisms
1.7. written, graphic or oral assessment strategy recognizes the role of microbes in nutrient cycling
1.8. written, graphic or oral assessment strategy associates laboratory tools and techniques of microbiology with their use in studying microbes

2. Use safe laboratory practices

Assessment Strategies

2.1. in the laboratory

Criteria

Performance will be successful when:

2.1. you identify hazards and safety equipment in the microbiology lab
2.2. you select personal protective equipment appropriate to the hazard
2.3. you follow all laboratory practice expectations of the college
2.4. you abide by the O.S.H.A. Guidelines, including Blood-Borne Pathogens Standards

3. Perform microbiological laboratory procedures according to appropriate safety standards

Assessment Strategies

3.1. in the laboratory

Criteria

Performance will be successful when:

3.1. you perform wet-mount and/or hanging-drop slide preparations
3.2. you perform Gram stains
3.3. you perform aseptic transfers
3.4. you obtain microbial samples for culture
3.5. you isolate colonies and/or plaques
3.6. you recognize pure and mixed cultures
3.7. you use biochemical test media or other means of organism identification
3.8. you accurately record observations and test results
3.9. you correctly use appropriate laboratory equipment
3.10. you use enumeration methods to calculate population density

4. Use a bright-field microscope to examine microbial cells

Assessment Strategies

4.1. in the laboratory

Criteria

Performance will be successful when:

4.1. you identify parts of the microscope and their functions
4.2. you adjust microscope for optimal viewing
4.3. you focus on a prepared slide sample using the low, high, and oil immersion lenses
4.4. you interpret microscopic observations
4.5. you demonstrate care and clean-up of microscopes
4.6. you contrast other types of microscopy with bright-field microscopy
4.7. you use safe laboratory practices
4.8. you perform microbiological laboratory procedures and techniques according to appropriate safety standards

5. Compare prokaryotic and eukaryotic cell structures and their functions

Assessment Strategies

5.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
5.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

5.1. written, graphic or oral assessment strategy identifies components of prokaryotic cells
5.2. written, graphic or oral assessment strategy identifies components of eukaryotic cells
5.3. written, graphic or oral assessment strategy describes the functions of cellular components
5.4. written, graphic or oral assessment strategy contrasts cellular structure and functions of prokaryotic and eukaryotic cells
5.5. written, graphic or oral assessment strategy contrasts the size and morphology of prokaryotic and eukaryotic cells

6. Explain microbial growth requirements and key microbial metabolic processes

Assessment Strategies

6.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
6.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

6.1. written, graphic or oral assessment strategy describes the phases of microbial growth
6.2. written, graphic or oral assessment strategy describes factors which affect microbial growth
6.3. written, graphic or oral assessment strategy describes microbial growth characteristics on various media including enriched, selective, and differential media
6.4. written, graphic or oral assessment strategy describes the role of enzymes in living organisms
6.5. written, graphic or oral assessment strategy differentiates among organisms on the basis of their ability to metabolize different substances
6.6. written, graphic or oral assessment strategydefines the role and output of glycolysis, fermentation, aerobic and anaerobic respiration in organism metabolism
6.7. written, graphic or oral assessment strategy defines aerobic, anaerobic, capnophilic, microaerphilic and facultatively anaerobic

7. Classify bacteria based on differentiating characteristics

Assessment Strategies

7.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
7.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

7.1. written, graphic or oral assessment strategy evaluates the results of differential stain techniques
7.2. written, graphic or oral assessment strategy describes bacteria based on microscopic and macroscopic morphology
7.3. written, graphic or oral assessment strategy evaluates the growth of organisms on enriched, selective and differential media
7.4. written, graphic or oral assessment strategy recognizes environments necessary for growth
7.5. written, graphic or oral assessment strategy describes the use of differential tests in identifying bacteria
7.6. written, graphic or oral assessment strategy assigns bacteria to taxonomic groups based on characteristics

8. Assess the impact of microbial genetics on humans and the environment

Assessment Strategies

8.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
8.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

8.1. written, graphic or oral assessment strategy outlines the processes of DNA replication, transcription and translation
8.2. written, graphic or oral assessment strategy differentiates among types of mutation and their impact
8.3. written, graphic or oral assessment strategy describes how bacteria can acquire new genetic information
8.4. written, graphic or oral assessment strategy describes the role of microbial genetics in biotechnology and molecular diagnostics
8.5. written, graphic or oral assessment strategy explains the impact of gene transfer on the spread of antibiotic resistance

9. Evaluate processes to control the growth of microbes in the body and in the environment

Assessment Strategies

9.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
9.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

9.1. written, graphic or oral assessment strategy differentiates between disinfection and sterilization
9.2. written, graphic or oral assessment strategy compares methods of disinfection and sterilization
9.3. written, graphic or oral assessment strategy describes modes of action of antibacterial agents
9.4. written, graphic or oral assessment strategy differentiates between broad-spectrum and narrow-spectrum agents
9.5. written, graphic or oral assessment strategy describes mechanisms of antibiotic resistance
9.6. written, graphic or oral assessment strategy identifies issues to consider in administering antimicrobial therapies
9.7. written, graphic or oral assessment strategy interprets the results of susceptibility testing procedures

10. Summarize pathogenic and non-pathogenic host-microbe interactions

Assessment Strategies

10.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
10.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

10.1. written, graphic or oral assessment strategy examines symbiotic relationships between humans and microbes
10.2. written, graphic or oral assessment strategy identifies mechanisms by which microbes cause disease
10.3. written, graphic or oral assessment strategy identifies the stages of an infectious disease
10.4. written, graphic or oral assessment strategy identifies the causes of hospital-acquired infections
10.5. written, graphic or oral assessment strategy describes the methods of infection control in clinical settings
10.6. written, graphic or oral assessment strategy describes the ubiquity of microbes
10.7. written, graphic or oral assessment strategy examines the role of opportunists in human disease
10.8. written, graphic or oral assessment strategy differentiates among terms used to explain characteristics of infectious disease

11. Analyze patterns of microbial disease transmission using principles of epidemiology

Assessment Strategies

11.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
11.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

11.1. written, graphic or oral assessment strategy compares communicable and noncommunicable diseases
11.2. written, graphic or oral assessment strategy identifies possible reservoirs of infection
11.3. written, graphic or oral assessment strategy examines various modes of disease transmission
11.4. written, graphic or oral assessment strategy differentiates between sporadic, endemic, epidemic, and pandemic conditions
11.5. written, graphic or oral assessment strategy evaluates the effect of herd immunity on disease transmission
11.6. written, graphic or oral assessment strategy describes methods of controlling disease outbreaks
11.7. written, graphic or oral assessment strategy explores new and re-emerging infectious disease agents

12. Summarize host defense mechanisms

Assessment Strategies

12.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
12.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

12.1. written, graphic or oral assessment strategy distinguishes between specific and non-specific host defenses
12.2. written, graphic or oral assessment strategy identifies non-specific host defense mechanisms
12.3. written, graphic or oral assessment strategy identifies the processes of natural, artificial, passive, and active immunity
12.4. written, graphic or oral assessment strategy describes antigen-antibody interactions
12.5. written, graphic or oral assessment strategy differentiates between humoral and cell-mediated immunity
12.6. written, graphic or oral assessment strategy explains the role of memory cells in lasting immunity

13. Evaluate immunopathology and immunological applications

Assessment Strategies

13.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
13.2. in the laboratory or classroom setting

Criteria

Performance will be successful when:

13.1. written, graphic or oral assessment strategy describes use of vaccines and immune globulins to confer specific immunity
13.2. written, graphic or oral assessment strategy differentiates among the types of hypersensitivity
13.3. written, graphic or oral assessment strategy explains the health consequences of immune hypersensitivity
13.4. written, graphic or oral assessment strategy describes the consequences of immune system dysfunction
13.5. written, graphic or oral assessment strategy identifies immunological methods of diagnosing infectious disease

14. Correlate select bacteria with human infectious disease

Assessment Strategies

14.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
14.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

14.1. written, graphic or oral assessment strategy describes microbial characteristics for select organisms
14.2. written, graphic or oral assessment strategy describes disease signs and symptoms for select organisms
14.3. written, graphic or oral assessment strategy describes disease transmission, diagnosis, treatment, and prevention for select organisms

15. Correlate select fungi and parasites with human infectious disease

Assessment Strategies

15.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course
15.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

15.1. written, graphic or oral assessment strategy defines eukaryotic parasites

15.2. written, graphic or oral assessment strategy describes characteristics of select fungi
15.3. written, graphic or oral assessment strategy describes characteristics of select protists and helminths
15.4. written, graphic or oral assessment strategy describes disease signs and symptoms for select organisms
15.5. written, graphic or oral assessment strategy describes disease transmission, diagnosis, treatment and prevention of select organisms

16. Correlate select viruses and prions with human infectious disease

Assessment Strategies

16.1. through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course

Criteria

Performance will be successful when:

16.1. written, graphic or oral assessment strategy describes viral morphology and the processes of viral replication
16.2. written, graphic or oral assessment strategy analyzes the impact of viruses on a host organism
16.3. written, graphic or oral assessment strategy describes disease signs and symptoms for select viruses
16.4. written, graphic or oral assessment strategy describes disease transmission, diagnosis, treatment and prevention for select viruses
16.5. written, graphic or oral assessment strategy describes prions and associated diseases