

## WTCS Repository

10-806-197 Microbiology

# Course Outcome Summary

### Course Information

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|  | 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 |

Target Population

This course is designed for Associated Degree and Technical Diploma students in Allied Health Programs requiring four credits of Microbiology.

Pre/Corequisites

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| 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

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| --- | --- |
| 1 | Explore the history and scope of the field of microbiology |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy describes the range of organisms studied by microbiologists  written, graphic or oral assessment strategy relates historical events to the current understanding of microbiology  written, graphic or oral assessment strategy evaluates the relationship between humans and microbes  written, graphic or oral assessment strategy describes the scope of microbes within industrial and environmental applications  written, graphic or oral assessment strategy uses correct writing conventions of binomial nomenclature  written, graphic or oral assessment strategy describes classification methods used for grouping organisms  written, graphic or oral assessment strategy recognizes the role of microbes in nutrient cycling  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 |
|  | in the laboratory |
|  | Criteria |
|  | Performance will be successful when: |
|  | you identify hazards and safety equipment in the microbiology lab  you select personal protective equipment appropriate to the hazard  you follow all laboratory practice expectations of the college  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 |
|  | in the laboratory |
|  | Criteria |
|  | Performance will be successful when: |
|  | you perform wet-mount and/or hanging-drop slide preparations  you perform Gram stains  you perform aseptic transfers  you obtain microbial samples for culture  you isolate colonies and/or plaques  you recognize pure and mixed cultures  you use biochemical test media or other means of organism identification  you accurately record observations and test results  you correctly use appropriate laboratory equipment  you use enumeration methods to calculate population density |
| 4 | Use a bright-field microscope to examine microbial cells |
|  | Assessment Strategies |
|  | in the laboratory |
|  | Criteria |
|  | Performance will be successful when: |
|  | you identify parts of the microscope and their functions  you adjust microscope for optimal viewing  you focus on a prepared slide sample using the low, high, and oil immersion lenses  you interpret microscopic observations  you demonstrate care and clean-up of microscopes  you contrast other types of microscopy with bright-field microscopy  you use safe laboratory practices  you perform microbiological laboratory procedures and techniques according to appropriate safety standards |
| 5 | Compare prokaryotic and eukaryotic cell structures and their functions |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy identifies components of prokaryotic cells  written, graphic or oral assessment strategy identifies components of eukaryotic cells  written, graphic or oral assessment strategy describes the functions of cellular components  written, graphic or oral assessment strategy contrasts cellular structure and functions of prokaryotic and eukaryotic cells  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 |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy describes the phases of microbial growth  written, graphic or oral assessment strategy describes factors which affect microbial growth  written, graphic or oral assessment strategy describes microbial growth characteristics on various media including enriched, selective, and differential media  written, graphic or oral assessment strategy describes the role of enzymes in living organisms  written, graphic or oral assessment strategy differentiates among organisms on the basis of their ability to metabolize different substances  written, graphic or oral assessment strategydefines the role and output of glycolysis, fermentation, aerobic and anaerobic respiration in organism metabolism  written, graphic or oral assessment strategy defines aerobic, anaerobic, capnophilic, microaerphilic and facultatively anaerobic |
| 7 | Classify bacteria based on differentiating characteristics |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy evaluates the results of differential stain techniques  written, graphic or oral assessment strategy describes bacteria based on microscopic and macroscopic morphology  written, graphic or oral assessment strategy evaluates the growth of organisms on enriched, selective and differential media  written, graphic or oral assessment strategy recognizes environments necessary for growth  written, graphic or oral assessment strategy describes the use of differential tests in identifying bacteria  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 |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy outlines the processes of DNA replication, transcription and translation  written, graphic or oral assessment strategy differentiates among types of mutation and their impact  written, graphic or oral assessment strategy describes how bacteria can acquire new genetic information  written, graphic or oral assessment strategy describes the role of microbial genetics in biotechnology and molecular diagnostics  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 |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy differentiates between disinfection and sterilization  written, graphic or oral assessment strategy compares methods of disinfection and sterilization  written, graphic or oral assessment strategy describes modes of action of antibacterial agents  written, graphic or oral assessment strategy differentiates between broad-spectrum and narrow-spectrum agents  written, graphic or oral assessment strategy describes mechanisms of antibiotic resistance  written, graphic or oral assessment strategy identifies issues to consider in administering antimicrobial therapies  written, graphic or oral assessment strategy interprets the results of susceptibility testing procedures |
| 10 | Summarize pathogenic and non-pathogenic host-microbe interactions |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy examines symbiotic relationships between humans and microbes  written, graphic or oral assessment strategy identifies mechanisms by which microbes cause disease  written, graphic or oral assessment strategy identifies the stages of an infectious disease  written, graphic or oral assessment strategy identifies the causes of hospital-acquired infections  written, graphic or oral assessment strategy describes the methods of infection control in clinical settings  written, graphic or oral assessment strategy describes the ubiquity of microbes  written, graphic or oral assessment strategy examines the role of opportunists in human disease  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 |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy compares communicable and noncommunicable diseases  written, graphic or oral assessment strategy identifies possible reservoirs of infection  written, graphic or oral assessment strategy examines various modes of disease transmission  written, graphic or oral assessment strategy differentiates between sporadic, endemic, epidemic, and pandemic conditions  written, graphic or oral assessment strategy evaluates the effect of herd immunity on disease transmission  written, graphic or oral assessment strategy describes methods of controlling disease outbreaks  written, graphic or oral assessment strategy explores new and re-emerging infectious disease agents |
| 12 | Summarize host defense mechanisms |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy distinguishes between specific and non-specific host defenses  written, graphic or oral assessment strategy identifies non-specific host defense mechanisms  written, graphic or oral assessment strategy identifies the processes of natural, artificial, passive, and active immunity  written, graphic or oral assessment strategy describes antigen-antibody interactions  written, graphic or oral assessment strategy differentiates between humoral and cell-mediated immunity  written, graphic or oral assessment strategy explains the role of memory cells in lasting immunity |
| 13 | Evaluate immunopathology and immunological applications |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in the laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy describes use of vaccines and immune globulins to confer specific immunity  written, graphic or oral assessment strategy differentiates among the types of hypersensitivity  written, graphic or oral assessment strategy explains the health consequences of immune hypersensitivity  written, graphic or oral assessment strategy describes the consequences of immune system dysfunction  written, graphic or oral assessment strategy identifies immunological methods of diagnosing infectious disease |
| 14 | Correlate select bacteria with human infectious disease |
|  | Assessment Strategies |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy describes microbial characteristics for select organisms  written, graphic or oral assessment strategy describes disease signs and symptoms for select organisms  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 |
|  | through a written, graphic or oral assessment strategy, including at least one or more instructor-provided written exams at various points throughout the course  in a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when: |
|  | written, graphic or oral assessment strategy defines eukaryotic parasites  written, graphic or oral assessment strategy describes characteristics of select fungi  written, graphic or oral assessment strategy describes characteristics of select protists and helminths  written, graphic or oral assessment strategy describes disease signs and symptoms for select organisms  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 |
|  | 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: |
|  | written, graphic or oral assessment strategy describes viral morphology and the processes of viral replication  written, graphic or oral assessment strategy analyzes the impact of viruses on a host organism  written, graphic or oral assessment strategy describes disease signs and symptoms for select viruses  written, graphic or oral assessment strategy describes disease transmission, diagnosis, treatment and prevention for select viruses  written, graphic or oral assessment strategy describes prions and associated diseases |