
## 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy describes the range of organisms studied by microbiologistswritten, graphic or oral assessment strategy relates historical events to the current understanding of microbiologywritten, graphic or oral assessment strategy evaluates the relationship between humans and microbeswritten, graphic or oral assessment strategy describes the scope of microbes within industrial and environmental applicationswritten, graphic or oral assessment strategy uses correct writing conventions of binomial nomenclaturewritten, graphic or oral assessment strategy describes classification methods used for grouping organismswritten, graphic or oral assessment strategy recognizes the role of microbes in nutrient cyclingwritten, 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 labyou select personal protective equipment appropriate to the hazardyou follow all laboratory practice expectations of the collegeyou 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 preparationsyou perform Gram stainsyou perform aseptic transfersyou obtain microbial samples for culture you isolate colonies and/or plaquesyou recognize pure and mixed culturesyou use biochemical test media or other means of organism identificationyou accurately record observations and test resultsyou correctly use appropriate laboratory equipmentyou 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 functionsyou adjust microscope for optimal viewingyou focus on a prepared slide sample using the low, high, and oil immersion lensesyou interpret microscopic observationsyou demonstrate care and clean-up of microscopes you contrast other types of microscopy with bright-field microscopyyou use safe laboratory practicesyou 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 coursein 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 componentswritten, graphic or oral assessment strategy contrasts cellular structure and functions of prokaryotic and eukaryotic cellswritten, 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 coursein 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 growthwritten, graphic or oral assessment strategy describes microbial growth characteristics on various media including enriched, selective, and differential mediawritten, graphic or oral assessment strategy describes the role of enzymes in living organismswritten, graphic or oral assessment strategy differentiates among organisms on the basis of their ability to metabolize different substanceswritten, graphic or oral assessment strategydefines the role and output of glycolysis, fermentation, aerobic and anaerobic respiration in organism metabolismwritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy evaluates the results of differential stain techniqueswritten, 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 mediawritten, graphic or oral assessment strategy recognizes environments necessary for growthwritten, graphic or oral assessment strategy describes the use of differential tests in identifying bacteriawritten, 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 coursein 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 translationwritten, 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 informationwritten, graphic or oral assessment strategy describes the role of microbial genetics in biotechnology and molecular diagnosticswritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy differentiates between disinfection and sterilizationwritten, graphic or oral assessment strategy compares methods of disinfection and sterilizationwritten, graphic or oral assessment strategy describes modes of action of antibacterial agentswritten, graphic or oral assessment strategy differentiates between broad-spectrum and narrow-spectrum agentswritten, graphic or oral assessment strategy describes mechanisms of antibiotic resistancewritten, graphic or oral assessment strategy identifies issues to consider in administering antimicrobial therapieswritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy examines symbiotic relationships between humans and microbeswritten, graphic or oral assessment strategy identifies mechanisms by which microbes cause diseasewritten, graphic or oral assessment strategy identifies the stages of an infectious diseasewritten, graphic or oral assessment strategy identifies the causes of hospital-acquired infectionswritten, graphic or oral assessment strategy describes the methods of infection control in clinical settingswritten, graphic or oral assessment strategy describes the ubiquity of microbeswritten, graphic or oral assessment strategy examines the role of opportunists in human diseasewritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy compares communicable and noncommunicable diseaseswritten, graphic or oral assessment strategy identifies possible reservoirs of infectionwritten, graphic or oral assessment strategy examines various modes of disease transmissionwritten, graphic or oral assessment strategy differentiates between sporadic, endemic, epidemic, and pandemic conditionswritten, graphic or oral assessment strategy evaluates the effect of herd immunity on disease transmissionwritten, graphic or oral assessment strategy describes methods of controlling disease outbreakswritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy distinguishes between specific and non-specific host defenseswritten, graphic or oral assessment strategy identifies non-specific host defense mechanismswritten, graphic or oral assessment strategy identifies the processes of natural, artificial, passive, and active immunitywritten, graphic or oral assessment strategy describes antigen-antibody interactionswritten, graphic or oral assessment strategy differentiates between humoral and cell-mediated immunitywritten, 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 coursein 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 immunitywritten, graphic or oral assessment strategy differentiates among the types of hypersensitivity written, graphic or oral assessment strategy explains the health consequences of immune hypersensitivitywritten, graphic or oral assessment strategy describes the consequences of immune system dysfunctionwritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy describes microbial characteristics for select organismswritten, graphic or oral assessment strategy describes disease signs and symptoms for select organismswritten, 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 coursein a laboratory or classroom setting |
|  | Criteria |
|  | Performance will be successful when:  |
|  | written, graphic or oral assessment strategy defines eukaryotic parasiteswritten, graphic or oral assessment strategy describes characteristics of select fungiwritten, graphic or oral assessment strategy describes characteristics of select protists and helminthswritten, graphic or oral assessment strategy describes disease signs and symptoms for select organismswritten, 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 replicationwritten, graphic or oral assessment strategy analyzes the impact of viruses on a host organismwritten, graphic or oral assessment strategy describes disease signs and symptoms for select viruseswritten, graphic or oral assessment strategy describes disease transmission, diagnosis, treatment and prevention for select viruseswritten, graphic or oral assessment strategy describes prions and associated diseases |