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| **Course Outline** |

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| **Department & Number** | BioSc 148 | **Number of Weeks** | 18 |
| **Course Title** | General Microbiology | **Lecture Hours** | 54 |
| **Prerequisite** | BioSc 106 and Chem 120 or BioSc159 and BioSc157 (Chem 120, BioSc157, or BioSc159 may be taken concurrently) | **Lab Hours** | 54 |
| **Challenge Policy** | BioSc 106 Challenge exam and permission of instructor. | **\*Hours By Arrangement** | 0 |
| **Co-requisite** |  | **Units** | 4 |
| **Challenge Policy** |  |  |  |
| **Advisory** |  |

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| **COURSE/CATALOG DESCRIPTION** |

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| This course, intended for majors, emphasizes the structure, morphology, physiology, genetics, evolution and diversity of microorganisms. It includes the effect of microorganisms on the human body and mechanisms for disease control and prevention. Topics include microscopy, culture of microbes and aseptic technique, control and identification of microbes, bacterial biochemistry, metabolism and physiology, cell structure and function, microbial genetics, recombinant DNA and biotechnology, viruses and their life cycles, immunology, epidemiology, and study of select infectious diseases. |

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| **COURSE OBJECTIVES** | |
| At the completion of the course the student will be able to: | |

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| Identify major groups of microbes including viruses, infectious agents, and prokaryotic and eukaryotic microbes. |
| Differentiate the structural features of various microbes (prokaryotic and eukaryotic) |
| Describe of the functions of microbial structures |
| Analyze the exchange and acquisition of genetic information among organisms. |
| Describe host defense mechanisms and microbial pathogenicity mechanisms |
| Demonstrate a knowledge of microbiological principles such as the methodology used to study microbes, microbial metabolism and how to control their growth |
| Discuss the ecology and evolution of microbes |
| Demonstrate a knowledge of the principles of molecular biology as they apply to microbes |
| Demonstrate a knowledge of the roles of microorganisms in biotechnology |
| Perform routine microbiological tasks aseptically |
| Perform laboratory techniques commonly used in biotechnology or molecular biology laboratories, such as: transformation, DNA extraction, restriction digests, agarose gel electrophoresis, PCR, sequence analysis, primer design, use of laminar flow hood, ELISA |
| Perform calculations used in microbiology laboratories, including serial dilutions, non-serial dilutions, metric conversions, use of exponents and scientific notation |
| Demonstrate proficiency in aseptic technique, differential staining techniques, using the streak plate technique to isolate clones from a mixed culture. |
| Analyze data using the scientific method, use analyzed data to produce written reports using scientific nomenclature and jargon accurately |

**COURSE CONTENT (LECTURE):**

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| Microbial Diversity and Classification: Viruses, Infectious Agents, Prokaryotic and Eukaryotic Microbes |
| Microbial Morphology: Structures and Function |
| Microbial Physiology: Aerobic and anaerobic respiration, Fermentation, Prokaryotic nutritional categories based on carbon and energy sources |
| Microbial Biochemistry: Proteins, Nucleic acids, Lipids, Carbohydrates |
| Viruses and their life cycles |
| Microbial Genetics: Replication, Gene expression pathways, Regulation of gene expression |
| Host-Microbe Interactions: Virulence factors, Endo- and exo-toxins, Non-specific and specific host defense mechanisms |
| The Immune Response |
| Disease Control/Prevention: Physical and chemical methods of microbial control, differentiated by prokaryotic target |
| Microbial Evolution |

**COURSE CONTENT (LAB):**

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| Microscopy techniques: Oil immersion, differential staining techniques |
| Use of differential and selective media |
| Microbial control: Physical and chemical methods (UV radiation, disinfectants and antiseptics, antibiotics) |
| Aseptic and sterile technique: Benchtop, sample manipulation using a laminar flow hood |
| DNA transformation of a plasmid clone, streak and Isolate a clone of bacteria, make a miniprep of plasmid DNA, restriction enzyme digest, run an agarose gel, analyze the plasmid genotype |
| Identify an organism via PCR: Sequence analysis, primer design, troubleshoot reaction |
| Identify an organism or protein using ELISA |

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| **METHODS OF INSTRUCTION** |

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| Lecture |
| Laboratory exercises |
| Team-based projects and discussions |
| Homework problems |
| Laboratory reports |
| Laboratory practical exams |
| Reports/presentations |

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| **INSTRUCTIONAL MATERIALS** |

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| **Textbook Title:** | Prescott’s Microbiology |
| **Author:** | Wiley, Sherwood, Wolverton |
| **Publisher:** | McGraw Hill |
| **Edition/Date:** | 9th, 2013 |

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| **Lab Manual Title:** | *Experiments in Microbiology: Biosc148* |
| **Author:** | Levine, Perez, Matiasek, Krolikowski |
| **Publisher:** | CCC Bookstore |
| **Edition/Date:** | 2nd, 2013 |

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| **COURSE EXPECTATIONS** (Use applicable expectations) |

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| **Outside of Class Weekly Assignments** | **Hours per week** |

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| Weekly Reading Assignments | 2 |
| Weekly Writing Assignments | 2 |
| Weekly Math Problems | 2 |
| Lab or Software Application Assignments | 2 |
| Other Performance Assignments |  |

**STUDENT EVALUATION**: **(Show percentage breakdown for evaluation instruments)**

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| 15 | **%** | Quizzes and homework assignments |
| 60 | **%** | Lecture and laboratory written and practical examinations |
| 15 | **%** | Laboratory reports |
| 10 | **%** | Technique demonstrations |

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| **GRADING POLICY (Choose LG, CR/NC, or SC)** |

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| X | **Letter Grade** |  | **Pass / No Pass** |  | **Student Choice** |
| 90% - 100% = A | | 70% and above = Pass | | 90% - 100% = A |
| 80% - 89% = B | | Below 70% = No Pass | | 80% - 89% = B |
| 70% - 79% = C | |  | | 70% - 79% = C |
| 60% - 69% = D | |  | | 60% - 69% = D |
| Below 60% = F | |  | | Below 60% = F |
| *or* |
| 70% and above = Pass |
| Below 70% = No Pass |

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| **Prepared by:** | Katherine Krolikowski, PhD |

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| **Content Review Date:** | October, 2013 |

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