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| **Course Outline** |

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| **Department & Number** | BioSc 185 | **Number of Weeks** | 18 |
| **Course Title** | Polymerase Chain Reaction, Theory and Applications  | **Lecture Hours** | 15 |
| **Prerequisite** | Biosc 159 or 172L or 148 (may be taken concurrently) | **Lab Hours** | 9 |
| **Challenge Policy**  | Successful completion of a college level course in Cell or Cell and Molecular Biology | **\*Hours By Arrangement** |  |
| **Co-requisite** |  | **Units**  | 1 |
| **Challenge Policy**  |  |  |  |
| **Advisory** |  |

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| **COURSE/CATALOG DESCRIPTION** |

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| This course will teach the theory and practice of DNA replication *in vitro* (the Polymerase Chain Reaction [PCR]), with emphasis on understanding the role of each reaction component. In addition, this course will provide students with hands-on experience in extracting genomic DNA from a variety of sources, choosing primer pairs needed to amplify selected genes, composing experimental and control reactions, programming the DNA thermalcycler, and analyzing the reaction products with agarose gel electrophoresis. Applications of PCR in medical diagnosis, forensic analysis, research, and agriculture will be discussed. |

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

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| 1. Demonstrate understanding of the fundamental principles of PCR methodology by selecting appropriate reagents for use in different PCR assays (primer pairs, molecular mass standards). |
| 2. Produce reliable data by correct use of instrumentation, including single channel micropipetors and a DNA thermal cycler. |
| 3. Cast an agarose gel and electrophorese amplified DNAs in that gel, stain the gel, obtain an image of the gel using the gel documentation system. |
| 4. Critically analyze amplified DNA data from PCR reactions. |

 **COURSE CONTENT:** (In detail; attach additional information as needed and include percentage breakdown)

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| Structure and function of DNA; roles of template, primer pairs, magnesium ions, deoxynucleotide triphosphates in DNA replication. |
| Extraction, amplification, and display of DNAs using PCR and agarose gel electrophoresis. |
| Analysis of amplified DNAs, generation of a reliable standard curve using molecular mass standards. |
| Use of agarose gel electrophoresis instrumentation, DNA thermalcyler, Gel documenation system. |

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| **METHODS OF INSTRUCTION** |

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| Lecture |
| Laboratory experimentation |
| Instruction on instrumentation, and supervised practice with instrumentation. |
| Small group work. |

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| **INSTRUCTIONAL MATERIALS** |

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| **Textbook Title:** | PCR Course Materials: BioSc 185 |
|  **Author:** | Katherine Krolikowski, PhD |
|  **Publisher:** | Note: this is not a textbook, but an instructional materials packet written by the instructor |
|  **Edition/Date:** | Spring 2011 |

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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 | 1 |
| Weekly Writing Assignments |  |
| Weekly Math Problems |  |
| Lab or Software Application Assignments | 1 |
| Other Performance Assignments |  |

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

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| 80 | **%** | Analyses of data generated by PCR experiments. |
| 20 | **%** | Final Examination |
|  | **%** |  |
|  | **%** |  |

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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 |

Revised 04/13