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| **logoDepartment of Life Sciences, School of Science**  **University of Management and Technology** | | | |
| BC-502: Recombinant DNA Technology (Section A1)  BT-502: Recombinant DNA Technology (Section A2) | | | |
| **Lecture Schedule** | **Section A1**:   * Wednesday – 06:30 – 09:30 PM | **Semester** | Spring 2024 |
| **Pre-requisite** | - | **Credit Hours** | 03 (***03 contact hours***) |
| **Instructor(s)** | Muhammad Irfan Fareed | **Contact** | [irfan.fareed@umt.edu.pk](mailto:irfan.fareed@umt.edu.pk) |
| **Office** | S2-45B | **Office Hours** | 03:00 – 05:00 PM  (***Monday - Friday***) |
| **Course Objectives** | To acquaint students with the experimental and applied aspects of Molecular Biology | | |
| **Learning Outcomes** | The expected outcomes of the course will be:   * To make students familiar with basic molecular biology. * To make students familiar with the basic principles of gene cloning and DNA analysis. * To delineate the steps used in gene manipulation, gene expression techniques, and recombinant protein development, and relate these processes to current commercial and research applications. * To describe the applications of molecular biology in areas such as biotechnological research, transgenic plants and animals, vaccines, forensic science and therapeutic agents | | |
| **Course Content** | Following topics will be included in this course (*detailed week-wise breakup is given at the end of the document*):   * Introduction to recombinant DNA technology; restriction and modifying enzymes; * cloning and expression vectors and their types; expression of recombinant * proteins and their purification by affinity chromatography; polymerase chain * reaction (PCR) - types; (inverse, touch-down, nested, hemi-nested, pit stop, * multiplex, reverse transcriptase, RACE, real-time) and its applications; detection * of mutations and/or SNPs; DNA fingerprinting; analysis of nucleic acids by gel * electrophoresis – horizontal, vertical, pulse field, denaturing gradient gel * electrophoresis; analysis of proteins by native and SDS-PAGE; 2-D gels; * generation of antibodies and their uses; enzyme-linked immunosorbant assay; * Southern, Western, Northern blotting. * Genetic Engineering, GMOs and the ethical concerns | | |
| **Reference book(s)** | * Ausubel FM, 2005. Short Protocols in Molecular Biology (2 volume set). 5th Edition; John Wiley and Son. * Green MR and Sambrook J, 2001. Molecular Cloning: A Laboratory Manual. 3rd Edition; Cold Spring Harbor Laboratory Press. * Primrose SB and Twyman R, 2006. Principles of Gene Manipulation and Genomics. 7th Edition; Wiley-Blackwell. * Wilson K and Walker J, 2010. Principles and Techniques of Biochemistry and Molecular Biology. 7th Edition; Cambridge University Press. * Walker JM and Rapley, 2008. Molecular Biomethods Handbook (Methods in Molecular Biology). 2nd Edition; Humana Press. * Gene cloning and DNA analysis. TA Brown. 6th Edition * The ABC of Gene Cloning. Dominic W.S. Wong. 2nd / 3rd Edition | | |
| **Grading Policy** | * Assignments (04) 10% * Quizzes (04) 10% * Case Study (01) 05% * Presentation (01) 05% * Midterm (01) 25% * Final (01) 45% | | |

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| **Session** | **Date**  **(DD-MM-YYY)** | **Week** | **Topic** |
| 1 |  | 1 | Techniques in Molecular Genetics I |
|  |
| 2 |  | 2 | Techniques in Molecular Genetics II |
|  |
| 3 |  | 3 | Genetic Engineering |
|  |
| 4 |  | 4 | Sequencing |
|  |
| 5 |  | 5 | Sequencing |
|  |
| 6 |  | 6 | Genome Editing I |
|  |
| **7** |  | **7** | **Midterm** |
|  |
| 8 |  | 8 | Genome Editing II |
|  |
| 9 |  | 9 | RNA Interference |
|  |
| 10 |  | 10 | Isothermal Amplification |
|  |
| 11 |  | 11 | Monoclonal Antibodies |
|  |
| 12 |  | 12 | Monoclonal Antibodies |
|  |
| 13 |  | 13 | Site-specific Recombination |
|  |
| 14 |  | 14 | Yeast Two-hybrid Assay |
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|  | | | **Final Exam** |