DEREE COLLEGE SYLLABUS FOR:

BI 1002 INTRODUCTION TO MOLECULAR BIOLOGY **3/1½/4**

(Revised Spring 2017)

PREREQUISITES:	No prerequisites
CATALOG DESCRIPTION:	Principles and applications of molecular biology, with emphasis on recombinant DNA technology, gene isolation and cloning, gene transfer into mammalian cells, transgenic animals, regulation of gene expression, molecular diagnostics, molecular biology of cancer and gene therapy.
RATIONALE:	This course examines the fundamental molecular mechanisms controlling cellular functions. New genetic technology regarding gene manipulation and cloning will be extensively described along with its possible applications. The course aims at providing the student with a knowledge and understanding of recent advances in molecular biology and genetics.
LEARNING OUTCOMES:	As a result of taking this course, the student should be able to: 1. Define the roles of genes in cell activity. 2. Discuss the importance of DNA manipulation and gene isolation, as well as the significance of gene transfer in mammalian cells. 3. Explain the regulatory control of gene expression. 4. Interpret the molecular basis and origin of cancer. 5. Discuss the power of gene therapy in modern therapeutics. 6. Develop the necessary analytical skills to understand the nature of scientific inquiry by practicing inquiry in the laboratory and by addressing the right questions and applying the appropriate methodology.
METHOD OF TEACHING AND LEARNING:	In congruence with the learning and teaching strategy of the college, the following tools are used: • Class lectures, interactive learning (class discussions, group work) video presentations, and practical problems solved in class. • Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class. • Laboratory work (some laboratory reports and drawings may be required). • CD-ROMS (Explorations in Cell Biology & Genetics). • http://www.blackwellpublishing.com/Allison • Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material. • Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resource
ASSESSMENT:	**Summative:** **Midterm examination** **40%** Midterm examination (2 hours): 30% (Multiple choice/short answers/essay questions) Midterm laboratory examination: 10% **Final examination** **60%** Final examination (2 hours): 50% (Multiple choice/short answers/essay questions) Final laboratory examination: 10% **Formative:**

	<table><tr><td>Multiple choice/short answers/essay questions (in class)</td><td>0</td></tr></table> The formative tests aim to prepare students for the examinations. Students are expected to submit feedback on their performance. The laboratory examinations test Learning Outcome 6. The midterm examination tests Learning Outcomes 1, and 2. The final examination tests Learning Outcomes 3, 4 and 5. The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. Students are not required to resit failed assessments in this module. Failure to pass the module results in module repeat.
INDICATIVE READING:	**Required Reading:** • Lizabeth A. Allison, **Fundamental Molecular Biology**, Wiley, 2nd edition. **Recommended Readings:** • James D. Watson, Richard M. Myers, Amy A. Caudy and Jan A. Witkowski, **Recombinant DNA – Genes and genomes – A short course**, W.H. Freeman and Company, New York, Cold Spring Harbor Laboratory Press.
INDICATIVE MATERIAL: *(e.g. audiovisual, digital material, etc.)*	**REQUIRED MATERIAL:** N/A **RECOMMENDED MATERIAL:** N/A
COMMUNICATION REQUIREMENTS:	Verbal skills using academic/professional English
SOFTWARE REQUIREMENTS:	Word, Powerpoint, Excel
WWW RESOURCES:	• http://ghr.nlm.nih.gov/: Genetics Home Reference • https://www.dnalc.org/: DNA Learning Center • http://www.maxanim.com/genetics/index.htm: Max Animations Genetics • http://multimedia.mcb.harvard.edu/media.html: Harvard DNA Animation Center • http://medtropolis.com/virtual-body/: Home of the virtual body • http://www.scientificamerican.com/: Scientific American web site
INDICATIVE CONTENT:	**CONTENT OUTLINE:** 1. The Beginnings of Molecular Biology 2. The Structure of DNA 3. The Versatility of RNA 4. Protein Structure and Folding 5. Genome Organization and Evolution 6. DNA Replication and Telomere Maintenance 7. DNA Repair Pathways 8. Recombinant DNA Technology and Molecular Cloning 9. Tools for Analyzing Gene Expression 10. Transcription in Bacteria 11. Transcription in Eukaryotes 12. Epigenetic Mechanisms of Gene Regulation 13. RNA Processing and Post-transcriptional Gene Regulation 14. The Mechanism of Translation

	15. Genetically Modified Organisms: Use in Basic and Applied Research 16. Genome Analysis: DNA Typing, Genomics and beyond Medical Molecular Biology **INDICATIVE LAB OUTLINE:** 1. Introduction to Molecular Techniques and Laboratory Safety 2. Preparation of Buffers and Media. 3. Isolation of Genomic DNA from Human Buccal Cells 4. Agarose Gel Electrophoresis & Visualization of PCR Products using a UV Transilluminator 5. Lab midterm 6. Polymerase Chain Reaction 7. Agarose Gel Electrophoresis & Visualization of PCR Products using a UV Transilluminator 8. Reverse Transcription – Polymerase Chain Reaction 9. Agarose Gel Electrophoresis & Visualization of RT-PCR Products using a UV Transilluminator 10. Lab Final