DEREE COLLEGE SYLLABUS FOR: BIO 2623 Computational Biology Fundamentals	3/1/3
(New: Fall 2026)	**UK LEVEL: (4** **UK CREDITS: 15**
PREREQUISITES:	MA1024 Algebra and Trigonometry (can be bypassed via a waiver test) **or** MA 1008 College Algebra BI 1000 Introduction to Biology I BI 1101 Introduction to Biology II BI 2222 Cell Biology ITC 2088 Introduction to Programming ITC 2193 Operating Systems Concepts
CATALOG DESCRIPTION:	This course provides an introduction to significant ideas that have formed the foundation for the transformation of the life sciences into a fully-fledged computational discipline. This gateway course is intended as a first exposure to computational biology and bioinformatics.
RATIONALE:	By completing this course, students will encounter a handful of fundamental algorithmic approaches deriving straight from very widely cited primary literature, much of which has been published in recent years. The course also briefly introduces basic concepts in statistics, mathematics, and machine learning necessary to understand these approaches. Many of the ideas central to modern computational biology have resulted in widely used software that is applied to analyse (often very large) biological datasets; an important feature of the course is that students will be exposed to this software in the context of compelling biological problems.
LEARNING OUTCOMES:	*As a result of taking this course, the student should be able to:* 1. Explain the fundamental principles of computational biology and bioinformatics. 2. Demonstrate understanding of how important biological and biomedical problems have been solved with the help of mathematical and computational methods. 3. Utilise the command line environment and additional bioinformatics software to tackle various biological problems. 4. Consider computational biology studies, addressing both technical and ethical perspectives.
METHOD OF TEACHING AND LEARNING:	In congruence with the teaching and learning strategy of the college, the following tools are used: • Class lectures, interactive learning (class discussions, group work) audio-visual presentations and other practical problems solved in class. • Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class. • Office hours held by the instructor to provide further assistance to students. • Use of library facilities for further study and preparation for the exams • Use of the Blackboard course management platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, formative quizzes and online submission of assignments.
ASSESSMENT:	Summative:

	<table><tr><td>1st assessment: Group coursework assignment, including written report and oral presentation on a specific computational biology related topic.</td><td>30%</td></tr><tr><td>2nd assessment: Portfolio of student work and oral assessment</td><td>10%</td></tr><tr><td>Final assessment: Comprehensive final exam that covers all topics covered in the lecture</td><td>60%</td></tr></table> **Formative:** <table><tr><td>Online quizzes, coding exercises and take-home problems throughout the course.</td><td>**0**</td></tr></table> The formative assessments aim to prepare students for the summative assessments and expose them to teamwork. The 1st summative assessment tests all Learning Outcomes. The final summative assessment tests all Learning Outcomes. *The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. If students pass the comprehensive assessment that tests all Learning Outcomes for this module and the average grade for the module is 40 or higher, students are not required to resit any failed assessments.*
INDICATIVE READING:	**REQUIRED READING:** BIOINFORMATICS ALGORITHMS – An active learning approach By Phillip Compeau – 3rd edition. Bioinformatics: Sequence and Genome Analysis by David Mount. ISBN-13: 978-8123912417 Introduction to Bioinformatics by Arthur Lesk. ISBN-13: 978-0198794141 Essentials of bioinformatics: An introduction for undergraduates By Akansha Singh, ISBN: 9781779560049 **RECOMMENDED READING:** Other sources, including journal and peer reviewed articles, research papers etc. recommended by the instructor throughout the semester.
INDICATIVE MATERIAL: *(e.g. audiovisual, digital material, etc.)*	**REQUIRED MATERIAL:** In class PowerPoint presentations **RECOMMENDED MATERIAL:** **N/A**
COMMUNICATION REQUIREMENTS:	N/A
SOFTWARE REQUIREMENTS:	MS Office and Blackboard CMS MS Teams
WWW RESOURCES:	https://www.youtube.com/user/bioinfalgorithms https://womengovtcollegevisakha.ac.in/departments/Bioinformatics%20Algo%27ms-%20An%20active%20learning%20approach.pdf

INDICATIVE CONTENT:	• Introduction to Computational Biology • Bioinformatics vs. Computational Biology • History of Bioinformatics and Health informatics • DNA, RNA, and Protein Sequencing • Genome assembly • The sequence alignment problem • Phylogenetics and evolutionary trees • RNA Sequencing • Proteins • Algorithms in nature • Significant ideas in computational biology • Ethical Issues in Computational Biology • Current Trends and Future Directions