

ISTANBUL TECHNICAL UNIVERSITY
GRADUATE SCHOOL OF SCIENCE, ENGINEERING, AND TECHNOLOGY
2020 - 2021 / FALL SEMESTER
BLG 553E – SPECIAL TOPICS IN COMPUTER ENGINEERING
(BIOINFORMATICS)
SYLLABUS

Course Title	Code	Semester	Hour (T+P)	Credit	ECTS
Special Topics In Computer Engineering (Bioinformatics)	BLG 553E	Fall	3	3	5
Prerequisites	None				
Language of Instruction	English				
Course Type (Required /elective)	Elective				
Instructors /e-mail / Office Hour	Ali Çakmak / ali.cakmak@itu.edu.tr / Wednesday 14:00 - 16:00 Mehmet Baysan / baysanm@itu.edu.tr / Monday 16:30 - 18:00				
Goals	This course aims to introduce basics of bioinformatics concepts and algorithms for some of the problems in the field.				
Learning Outcomes	<ul style="list-style-type: none"> • Knowledge of basic concepts of genetics and molecular biology. • Knowledge of classical bioinformatics algorithms. • Skills to read, criticize, and utilize research papers. • Skills to develop a research paper. 				
Course Content	Interactive in-class lectures covering basic concepts of molecular biology and genetics, algorithms for sequence alignment and analysis, genome rearrangements, motif and gene finding, DNA mapping, searching genomes, and systems biology. Students will also practice developing a research paper on a sizeable research problem. Moreover, students will perform critical paper reading in their selected project areas. Finally, students will give presentations summarizing their paper review and research paper components.				
Assessment Criteria	Assessment Components			Weight	
	Quizzes			30%	
	Paper Review and Presentation			20%	
	Research Paper: <ul style="list-style-type: none"> • Proposal: 5% • Related Work: Evaluated in the above item • Methods: 15% • Results: 20% • Presentation: 10% 			50%	
WEEKLY TOPICS AND PREPARATIONS					
Weeks	Topics				Reading
Week 1	Introduction, Algorithms Review (Lecturer: AÇ)				Chs 1, 2
Week 2	Molecular Biology Primer (Lecturer: MB)				Ch 3
Week 3	DNA Mapping, Finding Regulatory Motifs in Genome (Lecturer: MB)				Ch 4

Week 4 – Q1, Project Proposals	Revealing Genome Rearrangements (Lecturer: MB)	Ch 5
Week 5	DNA Sequence Comparison (Lecturer: AÇ)	Ch 6
Week 6 – Q2	Global and Local Sequence Alignment, Scoring Matrices (Lecturer: AÇ)	Ch 6
Week 7 – Related Work	Multiple Sequence Alignment (Lecturer: AÇ)	Ch 6
Week 8	Gene Prediction: Statistical and Similarity-based Approaches (Lecturer: AC)	Ch 6
Week 9 – Q3	Gene Prediction: Hidden Markov Models (Lecturer: AÇ)	Ch 11
Week 10	Student Presentations	
Week 11 – Q4, Progress Rep. (Methods)	DNA Sequencing Algorithms (Lecturer: MB)	Ch 8
Week 12	Discovering Repeats/Patterns in Genomes (Lecturer: MB)	Ch 9
Week 13 – Q5	Googling Genomes: Exact and Approximate Pattern Match (Lecturer: MB)	Ch 9
Week 14	Project Presentations	Week 14 – Term Papers

REFERENCES	
Main Textbook	An Introduction to Bioinformatics Algorithms by Neil C. Jones and Pavel A. Pevzner
Secondary Textbooks	<ul style="list-style-type: none"> • Understanding Bioinformatics by Marketa Zvelebil and Jeremy O. Baum • Selected papers from literature

ECTS / WORKING HOUR TABLE			
Activities	Number of Weeks	Duration (Hour)	Working Hours
Duration of the Course (Including Exams: 14 x Total Weekly Course Hour)	14	3	42
Extracurricular Working Hour (Preparatory Work, Review)	14	2	28
Assignments, Presentations, Internet Studies, etc.	14	5	70
Working Hours in Total			150
Working Hours in Total / 30			5
ECTS Credit of the Course			5