Course Unit Descriptor

Study Programme: Bachelor of Science in Biology			
Course Unit Title: Molecular Evolution			
Course Unit Code: OB057			
Name of Lecturer(s): Prof. Jasmina Ludoški			
Type and Level of Studies: Bachelor Academic Degree			
Course Status (compulsory/elective): Elective			
Semester (winter/summer): Winter			
Language of instruction: English			
Mode of course unit delivery (face-to-face/distance learning): face-to-face			
Number of ECTS Allocated: 6			
Prerequisites: None			
Course Aims: The Molecular evolution course introduces the students to the dynamics of evolutionary change at the molecular level, the driving forces behind the evolutionary process, novel evolutionary phenomena revealed by molecular data, the effects of various molecular mechanisms on the structure of genes and genomes, and the methodology involved in the statistical analysis of molecular data from an evolutionary perspective. The course provides basic knowledge of evolutionary change in nucleotide sequences, molecular phylogenetics (methods and examples), rates and patterns of nucleotide substitution, molecular clocks and DNA polymorphism in populations.			
Learning Outcomes: This course is designed to provide the student with a basic knowledge of factors and mechanisms of molecular evolution.			
Syllabus: *Theory* Dynamics of genes in populations: Genetic polymorphism, Roles of mutation and selection in molecular evolution, Codominant, dominant, recessive and overdominant mode of selection; DNA and amino acid sequence evolution: Models of nucleotide substitution, DNA sequence divergence; Rates and patterns of nucleotide substitution, Nonrandom usage of synonymous codons, Molecular clock; Molecular phylogenetics: Phylogenetic trees, Types of data, Methods of tree reconstruction, Gene trees and species trees; Reticulate evolution and phylogenetic networks; Divergent evolution of duplicated genes, Concerted evolution, Molecular tinkering; Evolution by transposition, Horizontal gene transfer; Gene organisation and evolution. *Practice* Alignment of nucleotide and amino acid sequence, Divergence between DNA sequences, Estimating the number of nucleotide substitutions between sequences: noncoding sequences, protein-coding sequences, amino acid sequences; Nonuniform rates of nucleotide changes; Molecular phylogenetics: tree construction, topological comparisons, assessing tree reliability.			
Required Reading: 1. Graur, D. (2016) Molecular and genome evolution. Sinauer Associates, Inc. Pub. USA 2. Milankov, V. (2007) Biološka evolucija. Prirodno-matematički fakultet, Novi Sad. 3. scientific papers			
Weekly Contact Hours:	**Lectures:** 2	**Practical work:** 2	
Teaching Methods: video beam, oral presentation, study of scientific papers			
Knowledge Assessment (maximum of 100 points):			

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Practical work		oral exam	70
Preliminary exam(s)		…….	
Seminar(s)	30		