ECTS catalog with learning outcomes
University of Montenegro

Faculty of Science and Mathematics / PHYSICS / COURSE OF MODERN PHYSICS I (PHYSICS OF PHASE TRANS

Course:	COURSE OF MODERN PHYSICS I (PHYSICS OF PHASE TRANS			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
12099	Mandatory	2	6	2+2+0
Programs	PHYSICS			
Prerequisites	Classical mechanics			
Aims	The aim of this course is for students to become better acquainted with the phenomena of phase transitions and critical phenomena, with an emphasis on gas-liquid phase transitions and phase transitions in ferromagnetic systems.			
Learning outcomes	Upon completion of this course, the student will be able to: 1. Describe the concept of the ordering parameter in a phase transition 2. Solve the Ising and generalized Heisenberg models 3. Understand the role of scaling in phase transitions 4. Reproduce the Ornstein-Zernike model for the scattering amplitude 5. Understand the Landau theory of phase transitions			
Lecturer / Teaching assistant	Professor Predrag Miranović, assistant Stevan Đurđević			
Methodology	Lectures, exercises, consultations			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Overview of basic results			
I week exercises				
II week lectures	Useful thermodynamic relations for liquids and magnetic systems			
II week exercises				
III week lectures	Exponents at the critical point and their mutual relations			
III week exercises				
IV week lectures	Van der Waals theory of gas-liquid phase transition			
IV week exercises				
V week lectures	Mean-field theory for magnetic phase transitions			
V week exercises				
VI week lectures	Correlation function			
VI week exercises				
VII week lectures	Ornstein-Zernike theory			
VII week exercises				
VIII week lectures	Models for phase transitions that allow exact solutions			
VIII week exercises				
IX week lectures	Results obtained by exact solution of the model for phase transitions			
IX week exercises				
X week lectures	Landau theory of exponents			
X week exercises				
XI week lectures	Scaling hypothesis for thermodynamic functions			
XI week exercises				
XII week lectures	Scaling of static correlation functions			
XII week exercises				
XIII week lectures	Introduction to the dynamics of critical phenomena in liquids			
XIII week exercises				
XIV week lectures	Measurement of dynamic structure factor in liquids			

XIV week exercises	
XV week lectures	Dynamic scaling laws
XV week exercises	
Student workload	

Per week	**Per semester**
6 credits x 40/30=8 hours and 0 minuts 2 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises **4 hour(s) i 0 minuts** of independent work, including consultations	Classes and final exam: **8 hour(s) i 0 minuts x 16 =128 hour(s) i 0 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **8 hour(s) i 0 minuts x 2 =16 hour(s) i 0 minuts** Total workload for the subject: **6 x 30=180 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **36 hour(s) i 0 minuts** Workload structure: **128 hour(s) i 0 minuts (cources), 16 hour(s) i 0 minuts (preparation), 36 hour(s) i 0 minuts (additional work)**
Student obligations	Students are required to attend lectures and exercises
Consultations	Every week on request
Literature	Introduction to phase transitions and critical phenomena, H. Eugene Stanley, Oxford University press (1987)
Examination methods	Tests (40 points), Homework (10 points), Final exam (50 points)
Special remarks	
Comment	

Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points