

## SYLLABUS 2016/2017

Level of study	Master's Course
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Course title in Ukraine	Статистична фізика		
Course title in English	Statistical Physics		
Course code		ECTS credits	5
Lecturer(s)	prof. Ryszard Radwański ,Dr. Renata Bujakiewicz-Korońska		

Course objectives (learning outcomes)	This course aims to get students acquainted with knowledge of laws, issues and concepts of classical physics. The course concentrates on knowledge of thermodynamic and statistic system description.
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### Prerequisites:

Knowledge	Knowledge of algebra and mathematical analysis, basic knowledge in Physics
Skills	Ability to differentiate, integrate, solve ordinary and partial differential equations, transform tensors.
Courses completed	First step studies in Physics

### Learning effects:

	Learning effects of the course	Relation of the learning effects to the specialization
Knowledge	<p><b>W01</b> A student knows the Newton's laws of motion.</p> <p><b>W02</b> A student knows the least action principle in configuration space. A student understands the concept of symmetry and knows the Noether theorem.</p> <p><b>W03</b> A student knows description of motion in the phase space and the Hamilton formalism.</p> <p><b>W04</b> A student knows Hamilton Jacobi equation.</p> <p><b>W05</b> A student knows the concept of chaos.</p>	W01 – W10

	Learning effects of the course	Relation of the learning effects to the specialization
Skills	<p><b>U01</b> A student applies the Newton's laws in solving mechanical problems.</p> <p><b>U02</b> A student constructs the action for variety of mechanical systems, obtains Euler-Lagrange equations and solve them.</p> <p><b>U03</b> A student constructs hamiltonian for mechanical systems, obtains Hamilton equations of motion and solves them. A student applies canonical transformations in order to simplify description of the system. A student constructs the algebra of integrals of motion with use of the Poisson theorem.</p> <p><b>U04</b> A student can solve Hamilton-Jacobi equation via additive separation of variables.</p> <p><b>U05</b> A student can study properties of simple maps and calculates volume dimension for simple fractal systems.</p>	U01 – U07

	Learning effects of the course	Relation of the learning effects to the specialization
Social skills	<p><b>K01.</b> A student has the creativity and the ability to conceptual thinking.</p> <p><b>K02</b> A student is able to present and justify the personal point of view.</p> <p><b>K03</b> A student is able to use the acquired knowledge and skills for the communication with the scientific community.</p> <p><b>K04</b> A student is aimed to expand personal knowledge and skills.</p> <p><b>K05</b> A student has the legal erudition.</p>	K01 – K06

### Course organization:

Form of classes	Lecture (W)	Group-exercises						
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)	
Contact hours	30		30				1	
Semester	3							
Language	English							

### Teaching methods:

The course consists of open for discussion and questions lectures and classes. In-class exercises are designed to probe knowledge with emphasis on how well students have understood the underlying topics of the course. Written and oral exam

**Assessment methods:**

	Other	Written exam	Oral exam	Written assignment (essay)	Student's presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
W01		X			X	X							
W02		X			X	X							
W03		X			X	X							
W04		X			X	X							
W05		X			X	X							
U01		X			X	X	X	X					
U02		X			X	X	X	X					
U03		X			X	X	X	X					
U04		X			X	X	X	X					
U05		X			X	X	X	X					
K01		X			X	X	X						
K02		X			X	X	X						
K03		X			X	X	X						
K04		X			X	X	X						
K05		X				X	X						

**Assessment criteria:**

Grades	<p>The grading scale will be as follows:</p> <p>90 – 100 % - <b>A</b> including <b>A- excellent</b> (eq. in Ukraine: відмінно (very good))</p> <p>82–89 % : <b>B</b> including <b>B – very good</b> (eq. in Ukraine: добре ( good))</p> <p>74–81 %: <b>C</b> including <b>C – good</b> (eq. in Ukraine: добре ( good))</p> <p>64–73 %: <b>D</b> including <b>D – satisfactory</b> (eq. in Ukraine: задовільно (satisfactory))</p> <p>60–63 %: <b>E</b> including <b>E – acceptable</b> (eq. in Ukraine: задовільно (satisfactory))</p> <p>&lt; 59 %: <b>F failed</b> (eq. in Ukraine: незадовільно (unsatisfactory))</p>
Criteria	<p><b>A.</b> A student knows all terms and concepts mentioned in W1-W5, U1- U5 and K1-K5. A student can work without any assistances, his/her knowledge's are creative and easily applied to decision of specific problem.</p> <p><b>B.</b> A student knows all terms and concepts mentioned in W1-W5, U1- U5 and K1-K5, yet needs a little help when decision of specific problem.</p> <p><b>C.</b> A student knows all terms and concepts mentioned in W1-W5, U1- U5 and K1-K5, however needs a help when decision of specific problem.</p> <p><b>D.</b> A student knows the most of terms and concepts mentioned in W1-W5, U1- U5 and K1-K5 and has difficulty in decision of specific problem.</p> <p><b>E.</b> A student knows only several terms and concepts mentioned in W1-W5, U1- U5 and K1-K5 and can solve only a simple problem.</p> <p><b>F.</b> A student does not know most of terms and concepts mentioned in W1-W5, he/she did not reach the satisfactory level of knowledge this course.</p>

**Course content (topic list):**

Topics	<b>W01</b> Laws of thermodynamics. <b>W02</b> Statistical Interpretation of Entropy. <b>W03</b> Auxiliary Functions. <b>W04</b> Maxwell 's equations, Gibbs-Helmholtz equation. <b>W05</b> Heat Capacity, Enthalpy, Entropy.
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**Literature:**

Compulsory reading	David R. Gaskell "Introduction to the thermodynamics of Materials"
Recommended reading	Berkeley course in Physics

**Estimation of the total working time of students:**

Contact hours	Lectures	60
	Seminars/classes	
	Other (consultation, meetings)	10
Students' work hours (without the lecturer)	Reading books and preparation for the lectures	10
	Preparation to the seminar	10
	Preparation of an individual presentation	10
	Preparation to the exam	25
Total works' hours		125
ECTS credits 1 ECTS = 25 h		5