PHYSICS

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| Course code | *FUN131* |
| Compulsory in the programmes | *Industrial Technology Management.* |
| Level of studies | *Undergraduate* |
| Number of credits and | *6 ECTS (48 contact hours + 6 consultation hours, 106 individual work hours)* |
| Course coordinator (title and name) | *Dr. Jonas Jurkevičius* |
| Prerequisites | *xxxx* |
| Language of instruction | *English* |

**THE AIM OF THE COURSE:**

To provide students with knowledge about classical and modern physics and form their practical abilities to apply fundamental nature laws.

**MAPPING OF COURSE LEVEL LEARNING OUTCOMES (OBJECTIVES) WITH DEGREE LEVEL LEARNING OBJECTIVES (See Annex), ASSESMENT AND TEACHING METHODS**

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| Course level learning outcomes (objectives) | Degree level learning objectives (Number of LO) | Assessment methods | Teaching methods |
| CLO1. Have a working knowledge of classical mechanics and its application to "standard" problems such as linear and rotational kinematics and dynamics. | BLO 1.1, BLO 1.2, BLO 4.1, BLO 4.3 | Control tests, Exam | Lectures, assisted practice, homework. |
| CLO2. Have a working knowledge of basics of oscillations, waves, sound. | BLO 1.1, BLO 1.2, BLO 4.1, BLO 4.3 | Control tests, Exam | Lectures, assisted practice, homework. |
| CLO3. Have a working knowledge of basic thermodynamic principles and relation with molecular kinetic theory. | BLO 1.1, BLO 1.2, BLO 4.1, BLO 4.3 | Control tests, Exam | Lectures, assisted practice, homework. |
| CLO4. Have a working knowledge of basic electrostatics, electrodynamics, magnetism, and electromagnetic induction. | BLO 1.1, BLO 1.2, BLO 4.1, BLO 4.3 | Control tests, Exam | Lectures, assisted practice, homework. |
| CLO5. Have a working knowledge of atomic material structure of matter, light properties, and radiation interaction with matter | BLO 1.1, BLO 1.2, BLO 4.1, BLO 4.3 | Control tests, Exam | Lectures, assisted practice, homework. |

**ACADEMIC HONESTY AND INTEGRITY**

The ISM University of Management and Economics Code of Ethics, including cheating and plagiarism are fully applicable and will be strictly enforced in the course. Academic dishonesty, and cheating can and will lead to a report to the ISM Committee of Ethics. With regard to remote learning, ISM reminds students that they are expected to adhere and maintain the same academic honesty and integrity that they would in a classroom setting.

**COURSE OUTLINE**

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| **Topic** | **In-class hours** | **Readings** |
| The nature of physics. Measurements. Dimentional analysis. Standarts and units Coordinate system. | 4 | Ch. 1 |
| Inertia. Linear motion. Displacement, velocity, acceleration; relation between them. Circular motion. | 4 | Ch. 2, 3, 8 |
| Linear dynamics. Force, mass, inertia. Newton’s laws. Momentum. The law of conservation of momentum. | 4 | Ch. 2, 4-6 |
| Work. Kinetic and potential energy. The law of energy conservation. Power. | 4 | Ch. 7 |
| Circular dynamics. Torque, rotational inertia. Kinetic energy of rotating and rolling body. Angular momentum. The law of conservation of angular momentum. | 3 | Ch. 8 |
| **Control work 1.** | 1 |  |
| Temperature. Heat. The ways of heat transfer. The ideal gas law. | 4 | Ch. 15-17 |
| The first and the second laws of Thermodynamics. Heat engines. Refrigerator. Entropy. | 4 | Ch. 18 |
| Oscillations: free, damped. Resonance. Waves. Sound. Doppler effect. | 4 | Ch. 19, 20 |
| Electric charge. Electric current, DC and AC. Electric conductors. | 3 | Ch. 22, 23 |
| **Control work 2.** | 1 |  |
| Magnetism. Electromagnetic induction. | 4 | Ch. 24, 25 |
| Electromagnetic waves. Spectrum. Light. | 4 | Ch. 26-31 |
| Semiconductors. Types of semiconductors, junctions. Transistor, light emitting diode, solar cell. | 3 | To be specified |
| **Control work 3.** | 1 |  |
|  | **Total: 48 hours** |  |
| CONSULTATIONS | 6 |  |
| FINAL EXAM | 2 |  |

**FINAL GRADE COMPOSITION**

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| **Type of assignment** | **Weight (%)** |
| Control Test 1 | 15 |
| Control Test 2 | 15 |
| Control Test 3 | 15 |
| Final Exam | 55 |
| **Total:** | **100** |

**DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT**

*(Provide short descriptions and grading criteria of each assignment)*

* The Control Tests will be taken in writing. Several (3-7) different questions will be presented – some as numerical problems, some as questions requiring theoretical analysis to produce the correct answer. The tests take one academic hour each. A single (A4) cheat-sheet may be used – this cheat-sheet can only contain hand-written formula list and nothing more. The students are required to bring their own means for writing and a calculator (not a calculator app!).
* The Final Exam is taken in writing. A number (>20) of different questions will be presented covering the whole course – some as numerical problems, some as questions requiring theoretical analysis to produce the correct answer, some as open ended questions. The exam takes two academic hours. The students are required to bring their own means for writing and a calculator (not a calculator app!).
* Each question of problem will be evaluated by a number of points, specified in the description. The number of total points earned will be converted to marks (1-10) for each test and exam.
* The final mark is calculated by the following formula:

*Final grade = 0.15×(CT1+CT2+CT3) + 0.55×E.*

Here *CT1*, *CT2* and *CT3* are marks for the respective control work assessment, *E* – mark for the exam.

* In order to pass the subject, the exam mark (*E*) must not be less than 5.0, irrespectively of the final mark.
* The students may have a single retake for the exam mark *E*.

**REQUIRED READING**

P. G. Hewitt, *Conceptual Physics, Global Edition*, 12th Edition, Pearson, 2015, 818 p.

**ADDITIONAL READING/RESOURCES**

To be specified.

**ANNEX**

**DEGREE LEVEL LEARNING OBJECTIVES**

**Learning objectives for the Bachelor of Business Management**

*Programmes:*

*International Business and Communication,*

*Business Management and Marketing,*

*Finance,*

*Industrial Technology Management,*

*Entrepreneurship and Innovation*

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| **Learning Goals** | **Learning Objectives** |
| Students will be critical thinkers | BLO1.1. Students will be able to understand core concepts and methods in the business disciplines |
| BLO1.2. Students will be able to conduct a contextual analysis to identify a problem associated with their discipline, to generate managerial options and propose viable solutions |
| Students will be socially responsible in their related discipline | BLO2.1. Students will be knowledgeable about ethics and social responsibility |
| Students will be technology agile | BLO3.1. Students will demonstrate proficiency in common business software packages |
| BLO3.2. Students will be able to make decisions using appropriate IT tools |
| Students will be effective communicators | BLO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations |
| BLO4.2. Students will be able to convey their ideas effectively through an oral presentation |
| BLO4.3. Students will be able to convey their ideas effectively in a written paper |

**Learning objectives for the Bachelor of Social Science**

*Programmes:*

*Economics and Data Analytics,*

*Economics and Politics*

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| **Learning Goals** | **Learning Objectives** |
| Students will be critical thinkers | ELO1.1. Students will be able to understand core concepts and methods in the key economics disciplines |
| ELO1.2. Students will be able to identify underlying assumptions and logical consistency of causal statements |
| Students will have skills to employ economic thought for the common good | ELO2.1.Students will have a keen sense of ethical criteria for practical problem-solving |
| Students will be technology agile | ELO3.1. Students will demonstrate proficiency in common business software packages |
| ELO3.2. Students will be able to make decisions using appropriate IT tools |
| Students will be effective communicators | ELO4.1.Students will be able to communicate reasonably in different settings according to target audience tasks and situations |
| ELO4.2.Students will be able to convey their ideas effectively through an oral presentation |
| ELO4.3. Students will be able to convey their ideas effectively in a written paper |