# MODULE DESCRIPTION

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|---|---|---|
| Module code | full-time studies: | **Z-ZIP1-E-402** |
| | part-time studies: | **Z-ZIPN1-E-402** |
| Module name | **Mechanics** | |
| Module name in Polish | **Mechanika** | |
| Valid from academic year | **2019/2020** | |

## MODULE PLACEMENT IN THE SYLLABUS

| | |
|---|---|
| Field of study | **MANAGEMENT AND PRODUCTION ENGINEERING** |
| Level of education | **1st degree** |
| Studies profile | **General** |
| Form and method of conducting classes | **Full-time and Part-time** |
| Specialisation | **All** |
| Unit conducting the module | **Department of Production Engineering** |
| Module co-ordinator | **Aleksandra Kumor-Sulerz, PhD** |
| Approved by: | **Dariusz Bojczuk, PhD, DSc** |

## MODULE OVERVIEW

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|---|---|
| Type of subject / group of subjects | **Major** |
| Module status | **Compulsory** |
| Language of conducting classes | **English** |
| Module placement in the syllabus - semester | **Semester IV** |
| Initial requirements | **Calculus I, Calculus II** |
| Examination (YES/NO) | **NO** |
| Number of ECTS credit points | **2** |

| **Method of conducting classes** | | **Lecture** | **Classes** | **Laboratory** | **Project** | **Other** |
|---|---|---|---|---|---|---|
| **Per semester** | full-time studies: | **15** | **15** | | | |
| | part-time studies: | **9** | **9** | | | |

## TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

| Category | Symbol | Learning outcomes | Assignations to the directional learning outcomes |
|---|---|---|---|
| Knowledge | W01 | A student has knowledge of describing the motion of a point and a body in terms of kinetics and dynamics by applying mathematical methods (differentiation of functions and differential equations). | ZIP1_W01 |
| | W02 | A student has knowledge of energy principles in mechanics, i.e. the principle of conservation of energy, the principle of energy-work equivalence, and understands the meaning of their universality. | ZIP1_W02 |
| Skills | U01 | A student is capable of doing simple analyses as regards kinematics and dynamics of the motion of a point and a body. | ZIP1_U01 |
| | U02 | A student can perform simple analyses basing on energy dependencies. | ZIP1_U02 |
| | U03 | A student has the ability of assessing the usefulness of the methods as regards analysing motion and energy methods in solving simple engineering issues. | ZIP1_U03 |
| Social competences | K01 | A student understands the need of constant improvement of his/her knowledge from the field of mechanics. | ZIP1_K01 |

## TEACHING CONTENTS

| Method of conducting classes | Teaching contents |
|---|---|
| Lecture | The motion of a point, the methods of describing the motion of a point.<br>Velocity and acceleration in the motion of a point.<br>The dynamics of a point, differentiation of the equations of a point.<br>The motion of a rigid body, classification. Translatory motion, rotational motion, angular velocity, and angular acceleration.<br>The velocity of points in a body in rotational motion, gears.<br>The dynamics of a rotational motion, inertial forces, dynamic reactions, and balancing.<br>The work by a force variable, power, kinetic energy of a point and a body, potential energy, and energy principles. |
| Classes | The motion of a point, the kinematics of a point.<br>The dynamics of a point, integrating the equations of motion.<br>Translatory motion of a body, , kinematics and dynamics<br>Rotational motion of a body – gears.<br>The dynamics of motion of a rigid body.<br>Work, power, and energy.<br>The principles of conservation of energy. |

## METODS OF ASSESSING TEACHING RESULTS

| Symbol | Methods of checking the learning outcomes *(select X)* | | | | | |
|---|---|---|---|---|---|---|
| | **Oral exam** | **Written exam** | **Test** | **Project** | **Statement** | **Other** |
| W01 | | | X | | | X |
| W02 | | | X | | | X |
| U01 | | | X | | | X |
| U02 | | | X | | | X |
| U03 | | | X | | | X |
| K01 | | | | | | X |

## FORM AND CONDITIONS OF PASSING

| Form of classes | Form of credit | Passing conditions |
|---|---|---|
| Lecture | Credit with grade | Obtaining at least 50% of final test. |
| Classes | Credit with grade | Obtaining at least 50% of test points during classes, active participation in classes. |

## STUDENT WORKLOAD

| Balance of ECTS points | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Type of student's activity | Student's workload | | | | | | | | | | Unit |
| | | full-time | | | | | part-time | | | | | |
| 1. | Participation in the activities | Lc | C | Lb | P | O | Lc | C | Lb | P | O | h |
| | | 15 | 15 | | | | 9 | 9 | | | | |
| 2. | Other (consultation, exam) | 2 | 2 | | | | 2 | 2 | | | | h |
| 3. | **Number of hours of a student's assisted work** | **34** | | | | | **22** | | | | | h |
| 4. | **Number of ECTS credit points which are allocated for assisted work** | **1,4** | | | | | **0,9** | | | | | ECTS |
| 5. | **Number of hours of a student's unassisted work** | **16** | | | | | **28** | | | | | h |
| 6. | **Number of ECTS credit points which a student receives for unassisted work** | **0,6** | | | | | **1,1** | | | | | ECTS |
| 7. | **Work input connected with practical classes** | **25** | | | | | **25** | | | | | h |
| 8. | **Number of ECTS credit points which a student receives for practical classes** | **1,0** | | | | | **1,0** | | | | | ECTS |
| 9. | **Total number of hours of a student's work** | **50** | | | | | **50** | | | | | h |

| | | | |
|---|---|---|---|
| 10. | **Punkty ECTS za moduł**<br>*1 ECTS=25 hours* | **2** | ECTS |

## LITERATURE


1. Anderson R.J, (2020), *The Practice of Engineering Dynamics*, Wiley.
2. Kurnik W. (2017), *Theoretical Mechanics for Engineers. Lectures*, Oficyna Wydawnicza Politechniki Warszawskiej.
3. Meriam J.L., Kraige L.G.; Bolton J.N. (2020), *Engineering Mechanics*, 9th Edition, Global Edition, John Wiley & Sons Inc.
4. Rashad Islam M., Monayem H Mazumder A K M, Mahbub A. (2022), *Engineering Dynamics. Fundamentals and Applications*, CRC Press.