

MODULE DESCRIPTION

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| Module code | Z-ZIP-555z |
| Module name | Laboratorium z podstaw automatyzacji |
| Module name in English | Laboratory in Fundamentals Automation |
| Valid from academic year | 2016/2017 |

A. MODULE PLACEMENT IN THE SYLLABUS

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|---------------------------------------|--|
| Field of study | Management and Production Engineering |
| Level of education | 1st degree <i>(1st degree / 2nd degree)</i> |
| Studies profile | General <i>(general / practical)</i> |
| Form and method of conducting classes | Full-time <i>(full-time / part-time)</i> |
| Specialisation | All |
| Unit conducting the module | The Department of Automatics and Robotics in the Laser Processing Research Centre |
| Module co-ordinator | Leszek Płonecki, PhD hab., Eng., Professor of the University |
| Approved by: | |

B. MODULE OVERVIEW

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| Type of subject/group of subjects | Major <i>(basic / major / specialist subject / conjoint / other HES)</i> |
| Module status | Compulsory <i>(compulsory / non-compulsory)</i> |
| Language of conducting classes | English |
| Module placement in the syllabus - semester | 6th semester |
| Subject realisation in the academic year | Summer semester <i>(winter / summer)</i> |
| Initial requirements | No requirements <i>(module codes / module names)</i> |
| Examination | No <i>(yes / no)</i> |
| Number of ECTS credit points | 1 |

| Method of conducting classes | Lecture | Classes | Laboratory | Project | Other |
|------------------------------|---------|---------|------------|---------|-------|
| Per semester | | | 15 | | |

C. TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

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| Module target | The aim of the module is to familiarise students with the structure and automation systems operations to facilitate the utilisation of the acquired knowledge during the lectures and recitation in the subject the Fundamentals of Automation. Laboratory classes are conducted utilising real automation systems in laboratory version and by computer simulations (work in teams of 2 or 3). |
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| Effect symbol | Teaching results | Teaching methods (l/c/lab/p/other) | Reference to subject effects | Reference to effects of a field of study |
|----------------------|---|---|-------------------------------------|---|
| W_01 | A student has knowledge as regards the principles of modelling simple mechanical, electric, and fluid systems. | l | K_W11 | T1A_W03 |
| W_02 | A student has knowledge as regards element analysis and automation systems in a time domain. | l | K_W01 K_W11 | T1A_W01 T1A_W03 T1A_W07 |
| W_03 | A student has knowledge as regards element analysis and automation systems in a frequency domain. | l | K_W01 K_W11 | T1A_W01 T1A_W03 T1A_W07 |
| W_04 | A student has knowledge connected with stability testing as well as quality assessment of automated control systems. | l | K_W01 K_W11 | T1A_W01 T1A_W07 T1A_W03 |
| W_05 | A student has basic knowledge as regards an analysis and synthesis of automation systems. | l | K_W11 | T1A_W03 |
| W_06 | A student has basic knowledge concerning the utilised measurement methods. | l | K_W08 | T1A_W04 |
| W_07 | A student has knowledge concerning simulation tests of automated systems. | l | K_W01 K_W02 K_W04 K_W11 | T1A_W01 T1A_W02 T1A_W03 T1A_W06 T1A_W07 |
| U_01 | A student is able to build a simulation model of an element or an automation system. | lab | K_U14 | TA1_U07 TA1_U08 TA1_U09 |
| U_02 | A student can experimentally determine a response of the system to a given disturbance. | lab | K_U09 | TA1_U08 |
| U_03 | A student can experimentally determine frequency characteristics of the system. | lab | K_U09 | TA1_U08 |
| U_04 | A student can test system stability and determine the values of quality indicators of an automation system for a real systems or its simulation model. | lab | K_U14 | TA1_U07 TA1_U08 TA1_U09 |
| U_05 | A student can make a synthesis of an automation system using basic methods. | lab | K_U03 | TA1_U03 |
| K_01 | A student can contribute to teamwork by accepting various roles in a team. | l/lab | K_U02 | TA1_U01 |
| K_02 | A student understands the necessity of continuous improvement of his/her knowledge as regards automation systems with reference to their dynamic development. | l/lab | K_U06 K_K01 | TA1_U05 T1A_K01 |
| K_03 | A student understands the usefulness of applying simulation tests of automated systems. | l/lab | K_U14 | TA1_U07 TA1_U08 TA1_U09 |

Teaching contents:

1. Teaching contents as regards lectures

| Lecture number | Teaching contents | Reference to teaching results for a module |
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| | | |

2. Teaching contents as regards classes

| Class number | Teaching contents | Reference to teaching results for a module |
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3. Teaching contents as regards laboratory classes

| Laboratory class number | Teaching contents | Reference to teaching results for a module |
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| 1 | Introductory classes. | W_06 W_07 K_01 K_02 |
| 2 | Modelling elements and systems. | W_01 W_07 U_01 K_01 K_02 K_03 |
| 3 | Determining the characteristics of basic elements. | W_02 W_07 U_01 U_02 K_01 K_02 K_03 |
| 4 | Determining the characteristics of PID controllers. | W_02 W_06 W_07 U_01 U_02 K_01 K_02 |
| 5 | Determining frequency characteristics. | W_03 W_07 U_01 U_03 K_01 K_02 K_03 |
| 6 | Testing the stability of systems. | W_04 W_07 U_01 U_04 |

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|---|-----------------------------------|--|
| | | K_01 K_02 K_03 |
| 7 | Testing a heat regulation system. | W_06 W_07 U_02 U_05 K_01 K_02 |
| 8 | Testing on-off control. | W_06 W_07 U_02 U_05 K_01 K_02 |

4. The characteristics of project assignments

The methods of assessing teaching results

| Effect symbol | Methods of assessing teaching results <i>(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)</i> |
|---------------|---|
| W_01 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_02 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_03 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_04 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_05 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_06 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| W_07 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. |
| U_01 | Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes. Checking the skills of making measurements and conducting simulation tests by assessing a student's initiative during the classes. |

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| U_02 | <p>Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes.</p> <p>Checking the skills of making measurements and conducting simulation tests by assessing a student's initiative during the classes.</p> |
| U_03 | <p>Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes.</p> <p>Checking the skills of making measurements and conducting simulation tests by assessing a student's initiative during the classes.</p> |
| U_04 | <p>Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes.</p> <p>Checking the skills of making measurements and conducting simulation tests by assessing a student's initiative during the classes.</p> |
| U_05 | <p>Assessing the correctness of the prepared reports from the completed tasks. Written tests prior to completing particular tasks; a mark from laboratory classes is a GPA of test and report marks. A written test at the end of the classes (for students with results below the GPA) which facilitates obtaining a credit and raising a mark for the classes.</p> <p>Checking the skills of making measurements and conducting simulation tests by assessing a student's initiative during the classes.</p> |
| K_01 | <p>Constant supervision over task division within a team; assessing teamwork skills.</p> <p>Observing a student's involvement during the classes; a discussion during the classes.</p> |
| K_02 | <p>Constant supervision over task division within a team; assessing teamwork skills.</p> <p>Observing a student's involvement during the classes; a discussion during the classes.</p> |
| K_03 | <p>Constant supervision over task division within a team; assessing teamwork skills.</p> |

D. STUDENT'S INPUT

| ECTS credit points | | |
|--------------------|---|--------------------|
| | Type of student's activity | Student's workload |
| 1 | Participation in lectures | |
| 2 | Participation in classes | |
| 3 | Participation in laboratories | 15 |
| 4 | Participation in tutorials (2-3 times per semester) | 2 |
| 5 | Participation in project classes | |
| 6 | Project tutorials | |
| 7 | Participation in an examination | |
| 8 | | |
| 9 | Number of hours requiring a lecturer's assistance | 17 <i>(sum)</i> |
| 10 | Number of ECTS credit points which are allocated for assisted work <i>(1 ECTS point=25-30 hours)</i> | 0.6 |
| 11 | Unassisted study of lecture subjects | |
| 12 | Unassisted preparation for classes | |
| 13 | Unassisted preparation for tests | |
| 14 | Unassisted preparation for laboratories | 8 |
| 15 | Preparing reports | 5 |
| 15 | Preparing for a final laboratory test | |
| 17 | Preparing a project or documentation | |
| 18 | Preparing for an examination | |
| 19 | | |
| 20 | Number of hours of a student's unassisted work | 13 <i>(sum)</i> |
| 21 | Number of ECTS credit points which a student receives for unassisted work <i>(1 ECTS point=25-30 hours)</i> | 0.4 |
| 22 | Total number of hours of a student's work | 30 |
| 23 | ECTS points per module <i>1 ECTS point=25-30 hours</i> | 1 |
| 24 | Work input connected with practical classes <i>Total number of hours connected with practical classes</i> | 30 |
| 25 | Number of ECTS credit points which a student receives for practical classes <i>(1 ECTS point=25-30 hours)</i> | 1 |

E. LITERATURE

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|-----------------|---|
| Literature list | <ol style="list-style-type: none"> 1. Żelazny M., <i>Podstawy automatyki</i>, PWN, Warszawa 1976. 2. Amborski K., <i>Teoria sterowania w ćwiczeniach</i>, PWN, Warszawa 1978. 3. Kaczorek T., <i>Teoria sterowania i systemów</i>, PWN, Warszawa 1996. 4. Stefański T., <i>Teoria sterowania t.1</i>, Wyd. Politechniki Śk., Skrypt Nr 367. Kielce 2002. 5. Dindorf R., Dziechciarz S., Łaski P., <i>Laboratorium z podstaw automatyzacji i robotyki</i>, Skrypt Politechniki Świętokrzyskiej nr 371, Kielce 2001. 6. Chłędowski M., <i>Wykłady z automatyki dla mechaników</i>, Wyd. Politechniki Rzeszowskiej 2003. |
| Module website | |

