

MODULE SPECIFICATION

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|---------------------------------------|--------------------------------|
| Module code | |
| Module title in Polish | Statystyka matematyczna |
| Module title in English | Mathematical Statistics |
| Module running from the academic year | 2016/2017 |

A. MODULE IN THE CONTEXT OF THE PROGRAMME OF STUDY

| | |
|---|--|
| Field of study | Civil Engineering |
| Level of qualification | First cycle <i>(first cycle, second cycle)</i> |
| Studies profile | Academic <i>(academic/practical)</i> |
| Mode of study | Full-time <i>(full-time / part-time)</i> |
| Specialism | |
| Organisational unit responsible for module delivery | The Department of Transportation Engineering |
| Module co-ordinator | Andrzej Brzoza, PhD |
| Approved by | Marek Iwański, Professor |

B. MODULE OVERVIEW

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| Module type | Core module <i>(core/programme-specific/elective HES*)</i> |
| Module status | Compulsory module <i>(compulsory / non-compulsory)</i> |
| Language of module delivery | English |
| Semester in the programme of study in which the module is taught | Semester 3 |
| Semester in the academic year in which the module is taught | Winter semester <i>(winter / summer)</i> |
| Pre-requisites | None <i>(module code/module title, where appropriate)</i> |
| Examination required | No <i>(yes / no)</i> |
| ECTS credits | 3 |

| Mode of instruction | lectures | classes | laboratories | project | others |
|---------------------------------|-----------|-----------|--------------|---------|--------|
| Total hours per semester | 15 | 15 | | | |

* elective HES – elective modules in the Humanities and Economic and Social Sciences

C. LEARNING OUTCOMES AND ASSESSMENT METHODS

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|--------------------|--|
| Module aims | The aim of the module is to familiarise students with the knowledge of mathematical statistics and the abilities of applying statistical methods in civil engineering. |
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| Module outcome code | Module learning outcomes | Mode of instruction (l/c/lab/p/others) | Corresponding programme outcome code | Corresponding discipline-specific outcome code |
|---------------------|---|--|--------------------------------------|--|
| W_01 | A student is knowledgeable about mathematical statistics. | l/c | B_W01 | T1A_W01 T1A_W02 |
| W_02 | A student knows the methods of gathering statistical data. | l/c | B_W22 | T1A_W02 T1A_W08 |
| U_01 | A student can apply statistical methods in civil engineering. | l/c | B_U01 | T1A_U08 T1A_U09 |
| K_01 | A student can work individually. | ć | B_K01 | T1A_K01 T1A_K03 T1A_K04 |
| K_02 | A student formulates conclusions and describes the results of his/her work. | ć | B_K04 | T1A_K01 T1A_K07 |

Module content:

1. Topics to be covered in the lectures

| No. | Topics | Module outcome code |
|-----|---|----------------------|
| 1 | The concept of a set, the elements of combinatorics, probabilistic space. A random event and probability. | W_01 |
| 2 | Discrete and continuous random variables: the distributions of probability, cumulative distribution function, the functions and numerical characteristics of a random variable. | W_01 |
| 3 | Basic probability distributions: two-dimensional, normal, and standardised. Limit theorems. | W_01 |
| 4 | The elements of descriptive statistics: interval series, frequency broken line, classical means, a median and other characteristics. | W_01 W_02 U_01 |
| 5 | Point and interval estimation, confidence intervals. | W_01 W_02 U_01 |
| 6 | Verifying statistical hypotheses: a Student's test, the chi-square test. The method of least squares. | W_01 W_02 U_01 |
| 7 | Linear regression and regression straight lines. | W_01 W_02 U_01 |

2. Topics to be covered in the classes

| No. | Topics | Module outcome code |
|-----|--|------------------------------|
| 1 | Random events and probability. | W_01 |
| 2 | Discrete and continuous random variables, numerical characteristics. | W_01 |
| 3 | Basic discrete and continuous probability distributions. | W_01 K_02 |
| 4 | The elements of descriptive statistics. | W_01 W_02 U_01 K_02 |
| 5 | Point and interval estimation. | W_01 W_02 U_01 |
| 6 | Verifying statistical hypotheses. | W_01 W_02 U_01 K_01 |
| 7 | Linear regression. | W_01 W_02 U_01 |

3. Topics to be covered in the laboratories

4. Topics to be covered in the projects

Assessment methods

| Module outcome code | Assessment methods <i>(Method of assessment; for module skills – reference to specific project, laboratory and similar tasks)</i> |
|---------------------|--|
| W_01 | A test, a report, and oral defence |
| W_02 | A test, a report, and oral defence |
| U_01 | A test, a report, and oral defence |
| K_01 | A test |
| K_02 | A test and a report |

C. STUDENT LEARNING ACTIVITIES

| ECTS summary | | |
|--------------|---|-----------------------------|
| | Type of learning activity | Study time/ credits |
| 1 | Contact hours: participation in lectures | 15 |
| 2 | Contact hours: participation in classes | 15 |
| 3 | Contact hours: participation in laboratories | |
| 4 | Contact hours: attendance at office hours (2-3 appointments per semester) | 5 |
| 5 | Contact hours: participation in project-based classes | |
| 6 | Contact hours: meetings with a project module leader | |
| 7 | Contact hours: attendance at an examination | |
| 8 | | |
| 9 | Number of contact hours | 35 <i>(total)</i> |
| 10 | Number of ECTS credits for contact hours <i>(1 ECTS credit =25-30 hours of study time)</i> | 1.4 |
| 11 | Private study hours: background reading for lectures | 7 |
| 12 | Private study hours: preparation for classes | 8 |
| 13 | Private study hours: preparation for tests | 10 |
| 14 | Private study hours: preparation for laboratories | |
| 15 | Private study hours: writing reports | 15 |
| 16 | Private study hours: preparation for a final test in laboratories | |
| 17 | Private study hours: preparation of a project/a design specification | |
| 18 | Private study hours: preparation for an examination | |
| 19 | | |
| 20 | Number of private study hours | 40 <i>(total)</i> |
| 21 | Number of ECTS credits for private study hours <i>(1 ECTS credit =25-30 hours of study time)</i> | 1.6 |
| 22 | Total study time | 75 |
| 23 | Total ECTS credits for the module <i>(1 ECTS credit =25-30 hours of study time)</i> | 3 |
| 24 | Number of practice-based hours <i>Total practice-based hours</i> | 5 |
| 25 | Number of ECTS credits for practice-based hours <i>(1 ECTS credit =25-30 hours of study time)</i> | 0.2 |