

| STUDY MODULE DESCRIPTION FORM | | |
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| Name of the module/subject Mathematics | | Code 1010101221010340004 |
| Field of study Environmental Engineering First-cycle Studies | Profile of study (general academic, practical) (brak) | Year /Semester 1 / 2 |
| Elective path/specialty - | Subject offered in: Polish | Course (compulsory, elective) obligatory |
| Cycle of study: First-cycle studies | Form of study (full-time, part-time) full-time | |
| No. of hours Lecture: 30 Classes: 15 Laboratory: - Project/seminars: - | | No. of credits 4 |
| Status of the course in the study program (Basic, major, other) (brak) | | (university-wide, from another field) (brak) |
| Education areas and fields of science and art | | ECTS distribution (number and %) |
| Responsible for subject / lecturer: Małgorzata Zbąszyniak email: -malgorzata.zbaszyniak@put.poznan.pl tel. -66552330 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań | | |
| Prerequisites in terms of knowledge, skills and social competencies: | | |
| 1 | Knowledge | Knowledge of real function calculus. |
| 2 | Skills | Calculations of derivatives and integrals of one variable functions. |
| 3 | Social competencies | Student understands the need and knows the possibility of studying, improving language skills, professional, personal and social skills. |
| Assumptions and objectives of the course: -The recognizing methods and applications of analytical geometry (vectors, lines in space, planes), mathematical analysis (calculus of functions of several variables) and differential equations. | | |
| Study outcomes and reference to the educational results for a field of study | | |
| Knowledge: | | |
| 1. Methods of calculation and applications of multiple and line integrals to describe and analyze selected physical phenomena. - [K_W01] | | |
| 2. Methods of solving differential equations. - [K_W01] | | |
| 3. The student explains the basic mathematical laws and explains conditions for their application. - [K_W02] | | |
| Skills: | | |
| 1. The student uses the literature and also other sources of knowledge. - [K_U01] | | |
| 2. The student learns to calculate and apply multiple and line integrals to describe and analyze selected physical phenomena. - [K_U10] | | |
| Social competencies: | | |
| 1. The sense of usefulness of mathematical competence in engineering practice. - [K_K01] | | |
| 2. The ability to work in a team. - [K_K03] | | |
| Assessment methods of study outcomes | | |

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| <p>-LECTURE. A two-part written examination at the end of the semester: -sat.1 theoretic knowledge (30%); -sat.2 applications in practical exercises (70%). Duration of test: 90 minutes.</p> <p>Classes: tests during the semester (5x15 or 6x15 minutes).</p> | | |
| Course description | | |
| <p>-Vectors, the dot product, the vector product. Lines in space, planes, the paraboloid of revolution, cylinders and the axis of the cone. -Gradient, directional derivative, tangent planes and normal lines to surfaces. -Multiple integrals and line integrals with applications. -Ordinary differential equations (separable, exact, homogeneous, Bernoulli, first-order and second-order linear). -Number series and power series.</p> | | |
| Basic bibliography: | | |
| <p>1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, część pierwsza i druga, Warszawa. 2. M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS.</p> | | |
| Additional bibliography: | | |
| <p>1. E. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt, Boston, Massachusetts 2. Dennis G. Zill, A first course in differential equations with applications, Prindle, Weber & Schmidt, Boston. 3. W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach, PWN, Warszawa.</p> | | |
| Result of average student's workload | | |
| Activity | Time (working hours) | |
| 1. Share in lectures | 30 | |
| 2. Share in classes | 15 | |
| 3. Preparing for classes and for written tests | 30 | |
| 4. Preparing for examination | 30 | |
| 5. Share in consultations. Examination period | 10 | |
| Student's workload | | |
| Source of workload | hours | ECTS |
| Total workload | 115 | 4 |
| Contact hours | 55 | 2 |
| Practical activities | 0 | 0 |