SUBJECT DESCRIPTION

Subject code: MFITB019

Subject title: Analytical geometry and differential calculus

Credit value: 10 ECTS, 267 hours, contact hours 140, student independent work hours 127.

Types of student learning activities:

<table>
<thead>
<tr>
<th>Classwork and tutorials</th>
<th>Hours</th>
<th>Student independent work/self-study</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>68</td>
<td>Preparation for intermediate test</td>
<td>30</td>
</tr>
<tr>
<td>Practicums</td>
<td>65</td>
<td>Completion of individual assignment</td>
<td>10</td>
</tr>
<tr>
<td>Tutorials/consultations</td>
<td>3</td>
<td>Preparation for practicums</td>
<td>22</td>
</tr>
<tr>
<td>Examination</td>
<td>4</td>
<td>Preparation for exam</td>
<td>65</td>
</tr>
</tbody>
</table>

Subject purpose:

<table>
<thead>
<tr>
<th>Study cycle</th>
<th>Study programme</th>
<th>Type of the subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>First cycle</td>
<td>Renewable Energy Resources Engineering</td>
<td>Compulsory</td>
</tr>
</tbody>
</table>

Subject objectives:

to develop a logical systematic thinking, the knowledge, skills and capability of self-improvement in mathematics; to develop an educated, systematic thinking personality, enhance logical thinking necessary for personal and professional development as well as further studies.

to prepare a qualified professional who is able to apply basic science knowledge for engineering, technological and technical problems; to develop the student as qualified person, to give him fundamental knowledge, to deepen their understanding of the theoretical and practical application of skills; to develop their capacity to identify and classify the technical problems interacting with the environment.

to promote student for life-long learning, for constantly improving their qualifications.

Prerequisites: basics of Mathematics at Secondary School.

Learning outcomes:

Knowledge and understanding:
knowledge of the basic concepts, statements, and the areas of use of techniques from linear algebra, vector differential and integral counting theory, the theory of differential equations.
Knowledge of the selection and applications capabilities of various methods for the calculation, visualization, interpretation and presentation of results.

Special abilities and skills:
ability to select and apply the linear and vector algebra methods for mechanics and physics problems;
skills of solving of exercises, related to the application of derivatives and integral values and attitudes:
will be fostered systematic environmental awareness and assessment.
Assessment criteria of learning outcomes:
1. Understanding the basic concepts of the subject of study and their physical meaning
2. Using of knowledge of mathematics to solve simple practice tasks.
3. Ability to use the technical - mathematical literature.

Subject content:

Lectures (68 hour):
1. Matrixes and actions with matrixes. Determinant. Linear equation systems and their solutions methods. (6)
5. Concept and characteristics of indefinite and definite integral. (10).

Training practice (65/22): purpose of the training practice - to master the material covered during lectures to deepen mathematical skills to develop the skills of practical problems solving.

Training practice subjects the lecture topics.
1. Training practice 1 – 6/2.
5. Training practice 5 – 10/3.
8. Training practice 8 – 6/2.

Methods of learning: lectures applying multimedia, practical trainings, consultations, self-study, discussions and work in groups.

Assessment methods and structure of student learning outcomes:
Assessment methods: control test, exam; defense of individual work, interview and informal assessment.

There is applied a ten-point criterion-cumulative assessment system.
Structure and terms of cumulative assessment

<table>
<thead>
<tr>
<th>Types of students’ independent work</th>
<th>Weight score</th>
<th>Deadlines of assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual work</td>
<td>0.1</td>
<td>September – December.</td>
</tr>
<tr>
<td>Control work (3)</td>
<td>0.4</td>
<td>1st - October.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2nd - November.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3rd - December.</td>
</tr>
<tr>
<td>Exam</td>
<td>0.5</td>
<td>Exam session</td>
</tr>
</tbody>
</table>

**Notes:**

1. The assessment score of each work must be greater than 4 points.
2. Examination includes two theory questions and 10 test questions.

**Interaction between study programme learning outcomes and learning methods and methods of student learning outcomes assessment**

<table>
<thead>
<tr>
<th>Study programme learning outcomes</th>
<th>Subject learning outcomes</th>
<th>Learning methods</th>
<th>Assessment methods of student learning outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of the theoretical basics of engineering sciences, understanding of their significance, purpose and application principles.</td>
<td>Knowledge of the basic concepts, statements, and the areas of use of techniques from linear algebra, vector differential and integral counting theory, the theory of differential equations.</td>
<td>Lectures, practical trainings, consultations, self-study, discussions and work in groups.</td>
<td>Control test, exam; defense of individual work, interview and informal assessment.</td>
</tr>
<tr>
<td></td>
<td>Knowledge of the selection and applications capabilities of various methods for the calculation, visualization, interpretation and presentation of results.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Application and coordination of different knowledge in pursuance for the achievement of a rational combination of environmental, human, technical and technological factors. | Ability to select and apply the linear and vector algebra methods for mechanics and physics problems; Skills of solving of exercises, related to the application of derivatives and integral | Lectures, practical trainings, consultations, self-study, discussions and work in groups. | Control test, exam; defense of individual work, interview and informal assessment. |

| Acquisition of skills and abilities of planning the actions, searching for various assessment and engineering solutions, spatial thinking and planning. | Skills of solving of exercises, related to the application of derivatives and integral | Lectures, practical trainings, consultations, self-study, discussions and work in groups. | Control test, exam; defense of individual work, interview and informal assessment. |

| Ability to provide well-reasoned arguments supporting own viewpoint when analyzing and solving problems related to professional activity, awareness of own | Will be fostered systematic environmental awareness and assessment | Lectures, practical trainings, consultations, self-study, discussions and work in groups. | Control test, exam; defense of individual work, interview and informal assessment. |
| Ability to deliver knowledge related to studies and activity field. Openness to the world, creativity, understanding of the need for constant self-development and correspondent skills. Honesty, diligence, sense of duty, self-confidence, and respect to other people and environment. | Will be fostered systematic environmental awareness and assessment | Lectures, practical trainings, consultations, self-study, discussions and work in groups. | Control test, exam: defense of individual work, interview and informal assessment. |

**Required literature references for subject study:**

**Recommended literature references for subject study:**

**Coordinating teacher:** assoc. prof. dr. D. Rimkuvienė, *Centre of Mathematics, Physics and Information Technologies*

**Other teachers:** assoc. prof. dr. D. Raškinienė, lect. J. Kaminskenė, lect. E. Laurinavičius, *Centre of Mathematics, Physics and Information Technology*
Author of the syllabus: lect. J. Kaminskienė, assoc. prof. dr. D. Rimkuvienė, Centre of Mathematics, Physics and Information Technology

Reviewers:
Centre of Mathematics, Physics and Information Technology: assoc. prof. dr. A. Lapinskas
Reviewer appointed by the Methodical Commission of the Faculty of Agricultural Engineering: lect. dr. Sigitas Petkevičius (Institute of Agricultural Engineering and Safety)

Approval at centre: Centre of Mathematics, Physics and Information Technology, 28 August 2013, Minutes No. 7.

Approval at program committee:
Subject description valid until: 31 August 2014.