### Field of study

Computer Science

### Degree level and programme type

Engineer's degree full-time programme

### Specialization/ diploma path

Study profile: academic

### Course name

Linear Algebra and Analytic Geometry 2

### Course code

FCS-00060

### Course type

obligatory

### Forms and number of hours of tuition

<table>
<thead>
<tr>
<th></th>
<th>L</th>
<th>C</th>
<th>LC</th>
<th>P</th>
<th>SW</th>
<th>FW</th>
<th>S</th>
<th>Semester</th>
<th>No. of ECTS credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>30</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>6</td>
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</tbody>
</table>

### Entry requirements

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### Course objectives

The aim of the course is to familiarize students with more advanced notions, theorems and methods of Linear Algebra, and their connections with Analytic Geometry.

### Course content

- Classes and lectures:
  - Specialization workshop: Eigenvalues and eigenvectors of linear endomorphisms, Jordan form of a matrix, bilinear forms, quadratic forms, Conic sections and quadric surfaces

### Teaching methods

Informative lecture, lecture problem, classic problem method, programming, subject exercises,

### Assessment method

Lecture: written test

Classes: two written in-class tests

Specialization workshop - evaluation of reports

### Symbol of learning outcome

#### LO1
recalls basic notions and theorems of Linear Algebra and Analytic Geometry, illustrates them by examples

#### LO2
presents correct mathematical reasonings using tools of Linear Algebra and Analytic Geometry

#### LO3
finds eigenvalues and eigenvectors of a matrix, checks the diagonalizability of a matrix

#### LO4
applies Gram-Schmidt process, finds orthogonal projection on a subspace, forms direct sums of linear spaces, forms quotient spaces

#### LO5
finds canonical form of quadratic forms, checks if a matrix is positive (negative) definite

### Reference to the learning outcomes for the field of study

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Reference to the learning outcomes for the field of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO1</td>
<td>K_W01</td>
</tr>
<tr>
<td>LO2</td>
<td>K_W01, K_U01</td>
</tr>
<tr>
<td>LO3</td>
<td>K_W01, K_U01</td>
</tr>
<tr>
<td>LO4</td>
<td>K_W01, K_U01</td>
</tr>
<tr>
<td>LO5</td>
<td>K_W01, K_U01</td>
</tr>
</tbody>
</table>

### Symbol of learning outcome

#### LO1
written test

#### LO2
written in-class tests, evaluation of reports

#### LO3
written in-class tests, evaluation of reports

#### LO4
written in-class tests, evaluation of reports

#### LO5
written in-class tests, evaluation of reports

### Methods of assessing the learning outcomes

#### Type of tuition during which the outcome is assessed

<table>
<thead>
<tr>
<th>Students workload (in hours)</th>
<th>No. of hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Attendance at lectures</td>
<td>30</td>
</tr>
<tr>
<td>2 - Attendance at classes</td>
<td>30</td>
</tr>
<tr>
<td>3 - Preparation for classes</td>
<td>40</td>
</tr>
<tr>
<td>4 - Preparation for tests</td>
<td>15</td>
</tr>
<tr>
<td>5 - Preparation for test</td>
<td>15</td>
</tr>
<tr>
<td>6 - Participation in specialization workshop</td>
<td>15</td>
</tr>
<tr>
<td>7 - Participation in student-teacher sessions</td>
<td>5</td>
</tr>
</tbody>
</table>

**TOTAL:** 150

### Student workload - activities that require direct teacher participation

<table>
<thead>
<tr>
<th>Description</th>
<th>Hours</th>
<th>No. of ECTS credits</th>
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<td>80</td>
<td>3.2</td>
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<tr>
<td></td>
<td>(7)+(1)+(2)+(8)</td>
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</table>

### Student workload - practical activities

<table>
<thead>
<tr>
<th>Description</th>
<th>Hours</th>
<th>No. of ECTS credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>4.0</td>
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<tr>
<td></td>
<td>(2)+(3)+(4)+(8)</td>
<td></td>
</tr>
</tbody>
</table>

### Basic references


### Supplementary references

1. T. Jankowski, Linear algebra, Politechnika Gdańska, Gdańsk, 2001

### Organisational unit conducting the course

Department of Mathematics

### Author of the programme

dr Krzysztof Piekarski

### Date of issuing the programme

Feb. 17, 2022

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**Notes:**

- L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work, S – seminar