**Course Syllabus**

**Course Code:** MAT 121

**Department:** Mathematics and Natural Sciences

**Course Title:** Analytic Geometry

**Semester:** 2, Spring 2023

**Credits/ECTS: 5**

**Degree Cycle (Level):** Bachelor

**Course Type:** Compulsory

**Language of Instruction:** English

**Requisites**

*The table below is automatically filled in if it is included in the Education Program*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Program Code | Educational program | Course Title | Consent status |
| * AR | MAT 121 |  | **Analytic Geometry** |  |
| * CR (Co-requisite) | **MAT 108** |  | **Algebra** |  |
| * PR (Prerequisite) | **MAT**  **123** |  | **Linear Algebra** |  |

**Programs on which course is available**

*If your course is taught in another Educational Program, that Educational Program automatically will be displayed in this table*

|  |  |  |  |
| --- | --- | --- | --- |
| Program Code | Program Title | Degree | Program Learning Outcome |
|  | Mathematics | Bachelor | * LO1 |
|  | Statistics and Data Science | Bachelor | * LO2 |

**Mode of Delivery**

* Face to Face
* Online
* Hybrid

**Course Description**

In addition to the traditional material (vector calculus, the method of coordinates, lines and surfaces of the first order, elementary theory of surfaces of the second order), which is typically included in the course of analytic geometry, this course contains the concepts of bivector and trivector, which facilitates the understanding of polyvector. The course also covers the complex plane in the affine and Euclidean versions.

**Instructors**

|  |  |  |
| --- | --- | --- |
| Name Surname | Degree | Contact information |
| 1. Saulet Borambayeva | Candidate of Science | saulet.borambayeva@sdu.edu.kz |
| 1. Aiman Shakulikova | Candidate of Science | aiman.shakulikova@sdu.edu.kz |
|  |  |  |

**Skills and competences**

|  |  |
| --- | --- |
| Academic Skills | Subject-Specific Skills |
| 2. the ability to apply a systematic approach for solving concrete tasks; | 2. using vector algebra for solving problems; |
| 3. the ability to determine concrete tasks within the framework of the goal, and the ability to choose optimal ways to solve them, based on the available resources; | 3. using various types of equations of lines and planes for solving problems; |
| 4. the ability to solve different kinds of mathematical problems (pure or applied). | 4. determining the type of curves and surfaces of the second order according to their canonical equations and drawing sketches of their graphs; |
|  | 5. exploring the properties of geometric objects according to a given equation. |

**Weekly course plan**

|  |  |  |
| --- | --- | --- |
| № | Topics | Activity |
| 1 | Vector calculus. |  |
| 2 | Linear dependence of vectors. Basis. Coordinate transformations when changing the basis |  |
| 3 | The equation of a line. Parametric equations of lines |  |
| 4 | First order lines |  |
| 5 | Lines of the second order. Ellipse, hyperbola |  |
| 6 | Parabola. Optical properties of second order curves |  |
| 7 | Transformation of equations when changing coordinates |  |
| 8 | Surface equation and line equation in space |  |
| 9 | Plane equation |  |
| 10 | Normal plane equation. Distance from a point to a plane. |  |
| 11 | Equation of a line in space |  |
| 12 | Surfaces of the second order. Ellipsoids and hyperboloids. |  |
| 13 | Paraboloids. Second order cone |  |
| 14 | Second order cylinders |  |
| 15 | Review |  |

**Course Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| Active verb | What will be done/produced | How this learning outcome will be achieved |
| developing basic understanding of Analytical Geometry; | A selection from the following methodological tools will be incorporated in the course:  - lectures;  - practical exercises, which consolidate theoretical material;  - individual tasks;  - independent work with textbooks in the library, i.e. independent study of certain theoretical aspects  - individual and group consultations on theoretical and practical aspects of the course;  - examination of the acquired knowledge, skills and abilities via oral and written assessments. |  |
| Contributing to the development of a general mathematical culture, to the ability to think logically, and to the ability of establishing logical connections between concepts; |  |  |
| Contributing to the formation of skills for solving geometric problems, and skills for independent analysis of the obtained results. |  |  |
|  |  |  |

**Planned Learning Activities and Teaching Method**

* Lecture
* Questions & Answer
* Discussion
* Problem Solving
* Other

*\*if other* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Reading List**

If the number of Required / Recommended / Other reading list is more than one, you can add a line below

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Type | Author | Title | Publishing year | ISBN | Publisher/Web site |
| * Required | 1. Постников М.М.  2.Douglas F Riddle | Аналитическая геометрия  Analytic Geometry | 1973  1996 |  |  |
| * Recommended | 1. А.Е.Умнов  2. . Клетеник Д. В | Аналитическая геометрия и линейная алгебра  Сборник задач по аналитической геометрии | 2011  1998 |  |  |
| * Other | http://www.exponenta.ru – образовательный математический сайт. |  |  |  |  |

**Assessment Methods and Criteria**

*The University’s normative rules regarding assessment apply. See the Code of Practice on Assessments.*

*These norms set the boundary conditions for all instructors of University.*

*If the pre-final grade is more than one, you can insert a row below in the table.*

|  |  |  |  |
| --- | --- | --- | --- |
| Assessment | Description | Quantity | % |
| * Pre-final | Midterm | 2 | 40 |
| * Pre-final | Quiz | 2 | 15 |
| * Pre-final | Homework | 5 | 5 |
| * Final | Exam | 1 | 40 |
| Total |  |  | 100 |

**Academic Integrity**

Students must ensure that all work completed for this course is their own work. Any evidence of plagiarism, data falsification, fabrication, collusion, self-plagiarism and/or other forms of academic misconduct will be penalised. Further, information can be found in the Code of Practice on Academic Integrity.

**Late/Non Submission and Attendance Policy**

Academic excellence and high achievement are only possible in an environment where the highest standards of academic honesty and integrity are maintained: students at SDU must ensure they adhere to this requirement. Active participation is an integral part of teaching and learning at SDU. Therefore, regular class attendance is required of all students and records of any absences are kept for each class: a student whose attendance falls below 70% will fail the course. Students are also expected to be in class on time: poor punctuality is seen as being discourteous to the teacher and other students, therefore repeat incidences of late arrivals are subject to a penalty. The use of electronic devices (e.g.: computers, tablets, phones) is only permitted upon tutor instruction. Any other activities (e.g.: texting, surfing, gaming, social emails, online shopping...etc.) are strictly forbidden during class time. Students found to be engaged in any non-class activity may lose marks for overall participation.

**Course Specific Policy**

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**Approved by Head of Department**

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