DESCRIPTION OF THE COURSE

Name of the course: **Advanced Mathematics I**	Code: **BASEe01**	Semester: **1**
Type of teaching: Lectures (L) Seminars (S)	Hours per semester: L – 15 hours S – 45 hours	Number of credits: **6**

LECTURER(S):
Assoc Prof. Aleksey Nikolov, PhD (FAMI), tel.: 965 3341, e-mail: ajn@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Aerospace Engineering, Professional orientation 5.5 Transport, shipping and navigation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to work with complex numbers and polynomials, to calculate determinants, to operate with matrices, to solve systems of linear equations, to operate with vectors and solve problems in two- and three-dimensional analytical geometry.

DESCRIPTION OF THE COURSE: The main topics concern: Matrices and determinants; Systems of linear equations; Vector calculus; Analytical geometry; Complex numbers and polynomials.

PREREQUISITES: Mathematics from the secondary school.

TEACHING METHODS: Traditional lectures and tutorials as well as interactive lessons using multimedia.

METHOD OF ASSESSMENT: Written exam during the session and continuous assessment over the self-study,

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:

1. Доневски Б., Петров Л., Бижев Г., Линейна алгебра и аналитична геометрия, ТУ-София, 2004.
2. Т. Д. Тодоров, Учебник по висша математика първа част, ЕКС-ПРЕС, 188 стр., ISBN 978-954-490-651-1, 2019.
3. К. Пеева, Математически анализ, София, 1997.
4. Маринов М. и колектив, Задачи за упражнения по висша математика I,II, 2006.
5. К. Пеева, М. Узунова, Изпитни задачи по Математика 1, София, 2000.
6. Л. Петров, Д. Беева, Модул 1, 2, 3, С., 2007.

DESCRIPTION OF THE COURSE

Name of the course: **Electrical Engineering and Electronics (1)**	Code: **BASEe02**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 15 hours T – 30 hours LW – 15 hours	Number of credits: **6**
Course project (CP)	Code:	Number of credits:

LECTURER(S):
Assoc. Prof. Dr. Nikolina Petkova (FA), tel.: 965 2498, e-mail: npetkova@tu-sofia.bg
Assoc. Prof. Dr. Simona Petrakieva (FA), tel.: 965 2388, e-mail: petrakievas-te@tu-sofia.bg
Assoc. Prof. Dr. Georgi Tsenov (FA), tel.: 965 3195, e-mail: gogotzenov@tu-sofia.bg
Prof. Assist. Dr. Stoyan Kirilov (FA), tel.:965 3319, e-mail: s_kirilov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: The course is compulsory for full-time students for receiving the B.Sc. degree in specialty “Aero Space Engineering” in the professional field 5.5 “Transport, shipping and aviation”.

AIMS AND OBJECTIVES OF THE COURSE: To introduce students to methods for description and analysis of direct current (DC) and alternative current (AC) electric circuits.

DESCRIPTION OF THE COURSE: The course includes: basic concepts and laws for linear DC and AC electric circuits, resonance phenomena, circuit theorems and electric circuits with mutual inductance.

PREREQUISITES: Mathematics I, Physics.

TEACHING METHODS: Lectures and tutorials are presented by multimedia. Laboratory practice are done with laboratory sets and appropriate measuring instruments. Written laboratory practice reports are required from students that are checked by the teacher.

METHOD OF ASSESSMENT: Written examination at the end of the first semester (80%) and protocol discussion (20%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. V. Mladenov, S. Vladov, "Theoretical electrical engineering", © IC "KING", 2021, 2021, ISBN: 978-954-9518-89-4, 2nd revised and supplemented edition, Sofia., 2. K. Brandiski, Zh. Georgiev, V. Mladenov, R. Stancheva., "Textbook of theoretical electrical engineering - Part I", IK KING 2004, ISBN 954-9518-28-0, Sofia., 3.K. Brandiski, S. Vladov, Zh. Georgiev, K. Ivanov, V. M. Mladenov and others, "Guide for seminar exercises in theoretical electrical engineering - Part I", IK KING 2004, ISBN 954-9518-26-4, Sofia ., 4. K. Brandiski, V. Mladenov, S. Petrakieva, "Guide for solving problems in theoretical electrical engineering with PSpice (OrCAD 16.3)", Sofia, IK KING, 2012, ISBN 978-954-9518-72-6 ., 5. K. Brandiski, Zh. Georgiev, K. Ivanov, S. Kirilov, V. Mladenov and others. "Guide to Laboratory Exercises in Theoretical Electrical Engineering - Part I", IK KING, 2017, ISBN: 978-954-9518-92-4.

edition, Dhanpat Rai & Co. (PVT) Ltd., 2010; 4. P.C. Jain and Monika Jain, Engineering Chemistry, 16th edition, Dhanpat Rai Publishing Company, 2016.

DESCRIPTION OF THE COURSE

Name of the course: **Engineering Chemistry**	Code: **BASEe03**	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 30 hours	Number of credits: 6

LECTURER(S):
Assoc. Prof. Eng. Alexander Zahariev, PhD (FETT) tel.: 965 3161, e-mail: alexs_zahariev@tu-sofia.bg
Assoc. Prof. Eng. Mihaela Georgieva, PhD (FEET), tel.: 965 2258, e-mail: mggeorgieva@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialties "Aerospace Engineering" and "Transport Engineering", Professional orientation 5.5. Transport, aeronautics and shipping, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of studying in the discipline "Engineering Chemistry" is for students to acquire fundamental and applied knowledge about the basic chemical processes and laws, the structure and properties of substances and their transformations, methods for obtaining and analyzing the composition of various widely used materials, as well as for basic and new chemical technologies applied in engineering. With this knowledge, the foundations are laid for studying further specialized courses. After completing the course, students should know the purpose and properties of various materials and technologies, with a view to their correct selection, as well as solve questions about the quality and reliability of the products, from the point of view of the chemical resistance of the materials used.

DESCRIPTION OF THE COURSE: Main topics concern: Contemporary theories about the structure of the atom and the nature of the chemical bond and their influence on the structure and properties of substances; Basic concepts in chemistry and electrochemistry related to various technological processes; Chemical power sources; Corrosion of metals and methods of corrosion protection; Fuels; Lubricating and cooling materials; Formation and properties of polymeric organic and inorganic materials; refractories, abrasive and dielectric materials; nanomaterials and their application in aerospace engineering.

PREREQUISITES: Basic knowledge of chemistry from the high school is necessary.

TEACHING METHODS: Lectures using a multimedia system and presentations; labs are performed in groups of 2-3 students, finishing with protocols, prepared by students and checked and estimated by the assistant professor.

METHOD OF ASSESSMENT: Written examination (open tests) two hours in the first regular session (70%) and three tests during the laboratory works (30%)

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1.T.L. Brown, H.E. LeMay Jr., B.E. Bursten, C.J. Murphy, P. Woodward, Chemistry – the central Science, 11th edition, Pearson Education Inc., 2009; 2. Shikha Agarwal, Engineering Chemistry - fundamentals and applications, Cambridge University Press, 2015; 3. Shashi Chawla, Theory and practical's of engineering chemistry, fifth edition, Dhanpat Rai & Co. (PVT) Ltd., 2010; 4. P.C. Jain and Monika Jain, Engineering Chemistry, 16th edition, Dhanpat Rai Publishing Company, 2016.

DESCRIPTION OF THE COURSE

Name of the course: **CAD for Aerospace Engineers**	Code: **BASEe04**	Semester: 1
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 0 hours S – 0 hours LW – 60 hours	Number of credits: 5

LECTURER(S):

Prof. Ph.D. G. TODOROV (FIT), tel.: 965 2574, e-mail: gdt@tu-sofia.bg,
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty "Aerospace Engineering in English", Faculty of Transport, Professional Field 5.5 Transport, Navigation and Aviation, Field of Higher Education 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion of the course, students should be able to apply CAD technologies and use them to solve engineering and industrial problems related to design, modeling, sizing and documentation, as well as data management in creating new products in the field of mechanical engineering by giving basic knowledge for further training in specialized disciplines.

DESCRIPTION OF THE COURSE: The students are acquainted with the basic principles, methods and techniques in the computer-aided product design & engineering and computer-aided process development in industry. A focus is set on key problems according to the state-of-the Art of CAD technologies using latest software for design dimensioning and documentation.

PREREQUISITES: Mathematics, Physics, Computer technology.

TEACHING METHODS: The study materials are presented using slides. Also there is a corresponding regularly updated script. The laboratory work is fully computer-based with a corresponding to the given problem manual.

METHOD OF ASSESSMENT: The acquired knowledge during the laboratory work is assessed with a 2 computer tests. A written exam (by test) at the end of the semester.

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:

ТОДОРОВ, Г., К. КАМБЕРОВ, ВИРТУАЛНО ИНЖЕНЕРСТВО, СОФИЯ 2015, 920 СТР.

- ТОДОРОВ, Г., Г. НИКОЛЧЕВА, П. ХАДЖИЙСКИ, СТ. ГЪЛЪБОВ, Д. ДАСКАЛОВА. ТЕХНОЛОГИИ И МАШИНИ ЗА ВИСОКОСКОРОСТНО ФРЕЗОВАНЕ , ИЗД.ТУ СОФИЯ, СОФИЯ 2010, ISBN 978-954-438-873-7, 320 СТР.
- ТОДОРОВ, Г., Я. Софронов, П. Събев. КОМПЮТЪРНО ПРОЕКТИРАНЕ НА СЛОЖНИ ФОРМООБРАЗУВАЩИ ПОВЪРХНИНИ(RAPID TOOLING), ИЗД.ТУ СОФИЯ, СОФИЯ 2021, ISBN 978-619-7671-15-5, 520 СТР
- Kunwoo, lee,-PRINCIPLES OF CAD/CAM/CAE Systems, Addison Wesley Publishing Ltd, New York,2019.
- Pham, D.T., S.S. Dimov. Rapid Manufacturing. Springer-Verlag London Limited, 2019, pp214.

DESCRIPTION OF THE COURSE

Name of the course: **Engineering Computer Science I (MATLAB and LabVIEW)**	Code: **BASEe05**	Semester: **1**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 15 hours LW – 45 hours	Number of credits: **6**
Course project – none	Code:	Number of credits:

LECTURER(S):
Assoc. Prof. PhD Vladislav Slavov (FA), TU-Sofia, email: v-slavov@tu-sofia.bg,
Assist. Prof. PhD Asparuh Markovski (FA), TU-Sofia, e-mail: agm@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Aerospace Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The purpose of the course is for students to acquire knowledge and skills for working in the LabVIEW environment, to familiarize themselves with its capabilities for creating measurement and control programs and graphic interfaces. Students are also introduced to MATLAB as a programming language, working with Simulink models, physical modeling language Simscape, generation of control codes, discrete event control models, as well as techniques for connecting to LabView, Simulink and MATLAB to external hardware.

DESCRIPTION OF THE COURSE: LabVIEW Basics – features and structure, creating and using virtual instruments, data and datasets. Application of virtual instruments (the programs created in the LabVIEW environment) for the control of measuring equipment and the collection and analysis of information. Synthesis and work with Plug&Play drivers. Characteristics and application of virtual sensors. Priority of execution of virtual instruments, rational use of computing resources. Data types, flow control (loops, conditional blocks, etc.).

The capabilities of MATLAB for simulation and control of real physical models are demonstrated. Basic MATLAB commands and work with arrays. Graphical visualization in MATLAB. Data types. Vector functions, logical and conditional operators. Numerical and symbolic solving of basic mathematical problems. Linear systems of equations. Finding the extremum of a function. Cycles. File-function. Classes and Objects in MATLAB. Building user interfaces using MATLAB App Designer. Getting to know the Simscape library. Modelling electrical circuits and electronic circuits in Simscape. Modelling mechanical systems with the Multibody library. Generating C/C++ code from a Simulink model and embedding it into a C/C++ project.

PREREQUISITES: Mathematics 1, Physics

TEACHING METHODS: Laboratory exercises, group work, and solving individual problems. Tasks for ongoing control.

METHOD OF ASSESSMENT: Laboratory work of each student (60%), laboratory work protocols defense and course work (40%)

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: 1. LabVIEW documentation 4. MATLAB documentation.

DESCRIPTION OF THE COURSE

Name of the course: **Advanced Mathematics II**	Code: **BASEe06**	Semester: **2**
Type of teaching: Lectures (L) Seminars (S)	Hours per semester: L – 15 hours S – 30 hours	Number of credits: **6**

LECTURER(S):
Assoc Prof. Aleksey Nikolov, PhD (FAMI), tel.: 965 3341, e-mail: ajn@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty Aerospace Engineering, Professional orientation 5.5 Transport, shipping and navigation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to be able to use differential and integral calculus of function of one real variable, in particular, to calculate limits of numerical sequences and of functions of one variable, to calculate derivatives and to study the behaviour of a function, to calculate definite and indefinite integrals.

DESCRIPTION OF THE COURSE: The main topics concern: Basic elementary functions, domain of a function, numerical sequences, limits, derivatives of a function and application, indefinite integral, definite integral.

PREREQUISITES: Mathematics I.

TEACHING METHODS: Traditional lectures and tutorials as well as interactive lessons using multimedia.

METHOD OF ASSESSMENT: Written exam during the session and continuous assessment over the self-study,

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:

1. К. Пеева, Математически анализ, София, 1997.
2. О. Каменов**,** Висша математика 2, СИЕЛА, София, 2001.
3. Т. Д. Тодоров, Учебник по висша математика втора част, ЕКС-ПРЕС, 178 стр., 2020.
4. Маринов М. и колектив, Задачи за упражнения по висша математика I, II, 2006.
5. И. Проданов, Н. Хаджииванов, И. Чобанов, Сборник от задачи по диференциално и интегрално смятане, СОФТЕХ, София, 2006.
6. Л. Петров, Д. Беева, Модули 4, 5, София, 2007

DESCRIPTION OF THE COURSE

Name of the course: Engineering Mechanics I (Statics&Kinematics)	Code: **BASEe07**	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours S – 30 hours LW – 0 hours	Number of credits: **6**

LECTURER(S):
Prof. Eng. Ivan Kralov, PhD, DSc (FT), tel.: 965 2540, e-mail: kralov@tu-sofia.bg
Assist. Prof. Eng. Ivo Angelov, PhD (FT), tel. 965 2234, e-mail: i.angelov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty "Aerospace Engineering in English", Faculty of Transport, Professional Field 5.5 Transport, Navigation and Aviation, Field of Higher Education 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: To introduce to students the main laws of the Classical Mechanics as well as the methods for mechanical modelling, solving and analysing of the typical mechanical systems.

DESCRIPTION OF THE COURSE: The course includes main axioms and laws of the Classical Mechanics. There are proofs and explanations of the basic theorems and rules of the Statics and Kinematics. Students acquire common knowledge about the methods and their application for solving problems in Mechanics.

PREREQUISITES: Advanced Mathematics I, Advanced Mathematics II.

TEACHING METHODS: Lectures, using PowerPoint slides and demo programs, seminar work and self-preparing.

METHOD OF ASSESSMENT: Two written tests during the term (each of 25% inclusion), ad final test during exam session (50% inclusion).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Buchvarov, S., Mechanics I – Statics, TU-Sofia, Sofia, 2007; 2. Kralov, I., Mechanics. Part I – Statics & Kinematics, TU-Sofia, Sofia, 2010; 3. Kralov, I., S. Tchitakov, Seminar courses for solving problems in Mechanics II – Dynamics, TU-Sofia, Sofia, 2008; 4. Kralov, I., S. Tchitakov, Seminar courses for solving problems in Mechanics I – Statics & Kinematics, TU-Sofia, Sofia, 2010; 5. Kralov, I., I. Ignatov, C. Velkova, T. Zhelyazov, Course for solving problems in Mechanics II – Dynamics, TU-Sofia, Sofia, 2015; 6. Johanson, Beer, Vector Mechanics for Engineers, part I and II, McGrawHill, USA, 1995.

DESCRIPTION OF THE COURSE

Name of the course: **Strength of Materials and Machine Elements Design**	Code: **BASEe08**	Semester: **2**
Type of teaching: Lections (L), Tutorials (T)	Hours per semester: L – 30 hours S – 45 hours	Number of credits: **6**

LECTURER(S):

Доц. д-р Николай Николов (ФТ), тел.: 965 3291, , e-mail: nyky@tu-sofia.bg

Доц. д-р Веселин Цонев (ФТ), tel.: 965 3111, e-mail: tzonev@tu-sofia.bg

Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory course for teaching students in educational qualification degree „bachelor", specialty „Aerospace Engineering", professional field 5.5. Transport, shipping and aviation, English language learning.

AIMS AND OBJECTIVES OF THE COURSE: The course aims to provide students with basic concepts and methods necessary for the design and stress-strain design of machine elements and metal structures.

The knowledge and skills acquired during the study of the discipline create prerequisites for the further study of other academic disciplines.

DESCRIPTION OF THE COURSE: Main topics: Basic principles, hypotheses and concepts; Geometric properties of plane shapes; Internal forces in straight beams and planar frames; Design in case of: pure tension (compression), pure bending, unsymmetrical bending, simultaneous bending and tension (compression), bending and shear (transverse loading), pure torsion, bending and torsion; Stress state in the vicinity of a point; Conditions for strength in case of complex stress state; Buckling of compressed beams; Fatigue of materials; Introduction to the design of machine elements; Accuracy and interchangeability of machine elements; Machine elements for construction of detachable joints; Transmissions: lead screw, gear, chain, belt; Springs; Axles and shafts; Bearings; Clutches.

PREREQUISITES: Mathematics, Physics, Mechanics.

TEACHING METHODS: Lectures and tutorials taught through multimedia presentations and/or in the classical way.

METHOD OF ASSESSMENT: Exam, consisting of a test that includes 20 questions

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:

1. Lecture notes and exercise notes.

2. G. Stoychev, Strength of materials, Sofia, 2006.

3. N Nikolov, E. Chankov, Strength of materials, Handbook, Avangard Prima, Sofia, 2013.

4. R.C. Hibbeler, Mechanics of Materials, Pearson Higher Ed, 2018.

5. S.R. Schmid, B.J. Hamrock, B.O. Jacobson, Fundamentals of machine elements. CRC Press, 2013.

6. R.C. Juvinall, K.M. Marshek, Fundamentals of machine component design, John Wiley & Sons, 2020.

DESCRIPTION OF THE COURSE

Name of the course: **Electrical Engineering and Electronics (2)**	Code: **BASEe09**	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **6**

LECTURER(S):
Assoc. Prof. Eng. Georgi Nikolov, PhD (FEET), tel.: 965 3269, e-mail: gnikolov@tu-sofia.bg
Assist Prof. Eng. Dimitar Nikolov, PhD (FEET),, tel. 965 3269, e-mail: d_nikolov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty "Aerospace Engineering in English", Faculty of Transport, Professional Field 5.5 Transport, Navigation and Aviation, Field of Higher Education 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course aims to familiarise students with the basic building elements of electronic circuits. At the end of the course the students are expected to have basic knowledge and to be able to apply the basic semiconductors elements, to know their characteristics, mode of operation, important parameters, and to choose appropriate device for given application using datasheets.

DESCRIPTION OF THE COURSE: The main topics concern: Introduction to Semiconductors, PN Junction Diodes, Zener Diodes, Bipolar Junction Transistors, Metal Oxide Semiconductor Field Effect Transistors, Optoelectronic Devices, Fundamental circuits and applications, Introduction to Integrated Circuit.

PREREQUISITES: Physics, Mathematics.

TEACHING METHODS: Lectures, using PowerPoint slides, case studies, laboratory and course work description preparation and defence.

METHOD OF ASSESSMENT: Exam during the exam session. Final mark is calculated based on the written exam (60%), laboratory work (30%), lecture attendance (10%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Floyd T., Electronics Fundamentals: Circuits, Devices & Applications, 8th Edition, Pearson, 2010; 2. Malvino, A. Electronic principles, McGraw-Hill Education, 2015.

DESCRIPTION OF THE COURSE

Name of the course: **Engineering Computer Science II (Python)**	Code: **BASEe10**	Semester: **II**
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 15 hours S – 0 hours LW – 45 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Veska Gancheva, PhD (FCST), tel.: 965 2078, e-mail: vgan@tu-sofia.bg
Assist Prof. Eng. Elena Kalcheva-Yovkova, PhD (FCST), tel. 965 2042, e-mail: elena@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtain Bachelor's degree, specialty "Aerospace Engineering in English", Faculty of Transport, Professional Field 5.5 Transport, Navigation and Aviation, Field of Higher Education 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to acquire fundamental knowledge for good practices in the software industry, methodology for designing, developing and integrating software products, quality code principles and software project management, and to give students basic knowledge for developing different types of software applications using programming language Python.

DESCRIPTION OF THE COURSE: Main topics: Modelling, design and integration of software; Python programming language syntax; Basic language constructions; Data structures; Basic types of operators, data and calculations; Functions and files; Modules and packages; Object oriented programming; Classes, methods, attributes, constructors, inheritance; Graphical user interface; More complex structures and language constructions; Software implementation using date and time, formats CSV; Parallel programming; Synchronous and asynchronous programming; Introduction to data science and machine learning; Data analysis and scientific calculations; Creation of static, animated and interactive visualizations; Project management tools..

PREREQUISITES: Advanced Mathematics I, Advanced Mathematics II, Engineering Computer Science I..

TEACHING METHODS: Lectures, using PowerPoint slides, case studies, laboratory and course work description preparation and defence.

METHOD OF ASSESSMENT: Exam (70%), laboratories (10%), course work (20%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Mark Lutz, Learning Python, O'Reilly, 2013. 2. Paul Jones, Python: The Fundamentals of Python Programming, 2016. 3. Luciano Ramalho, Fluent Python: Clear, Concise, and Effective Programming, O'Reilly, 2015. 4. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython, 2nd Edition, O'Reilly, 2017. 5. Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, 3rd ed., Pearson Education, 2012.

DESCRIPTION OF THE COURSE

Name of the course: **Introduction to Satellites and their Applications**	Code: **FaBASEe01**	Semester: 2
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 25 hours	Number of credits: 4

LECTURER(S):
Assoc. Prof. Margarita Andonova, PhD (FT tel.: 965 3078, e-mail: magi_andonova@tu-sofia.bg
Assist Prof. Eng. Dimitar Ginchev, PhD (FT), tel. 965 2035, e-mail: dimginchev@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Optional course from the curriculum for training of students to obtain Bachelor's degree, specialty "Aerospace Engineering in English", Faculty of Transport, Professional Field 5.5 Transport, Navigation and Aviation, Field of Higher Education 5. Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the discipline is to master the foundation, industry, methodology for design, development and integration of satellites, quality production and their management, and implementation of projects planning space missions to be able to realize their launch.

DESCRIPTION OF THE COURSE: Main topics: History, Modeling, design and integration of software; Base structures; Structures and systems; Main types of satellites; Data, work with them, calculations and databases; User interface; Data analysis and scientific calculations; Satellite creation, visualizations and mission planning; Project management tools.

PREREQUISITES: Advanced Mathematics I, Advanced Mathematics II, Engineering Computer Science I.

TEACHING METHODS: Lectures, using PowerPoint slides, case studies, laboratory work.

METHOD OF ASSESSMENT: Exam (70%), laboratories (10%), work in course (20%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:
11. P. R. K. Chetty, Satellite Technology and Its Applications: 3rd Edition, 2023.

2. Anil K. Maini, Varsha Agrawal, Satellite Technology: Principles and Applications, 2014.

3. William Emery, Adriano CampsIntroduction to Satellite Remote Sensing Atmosphere, Ocean, Land and Cryosphere Applications, 2017.

4. Joseph N. Pelton, Scott Madry, Sergio Camacho-Lara, Handbook of Satellite Applications, 2018.

5. Don I. Dalgleish, D. I. Dalgleish, An Introduction to Satellite Communications, 1989.

6. Ieva Bekeryte, Satellite Systems - History, Definition, Functioning, 2007.

7Ram Jakhu, Paul Stephen Dempsey, Routledge Handbook of Space Law, 2016.

8. Oliver Montenbruck, Eberhard Gill, Satellite Orbits: Models, Methods and Applications, 2012.