DESCRIPTION OF THE COURSE

Name of the course: **Satellite Design 1**	Code: **BASEe33**	Semester: 7
Type of teaching: Lectures (L) Seminars (S) Laboratory work (LW)	Hours per semester: L – 30 hours S – 15 hours LW – 0 hours	Number of credits: **6**

LECTURER(S):
Assoc. Prof. Eng. Hristian Panaiotov, PhD (FT), tel.: 965 659518, e-mail: hristian@tu-plovdiv.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 goal of the course is to give the students basic knowledge of System Engineering Method and its implementation in Satellite design, research and development. Students at the end of this course are supposed to analyse space mission objectives and conduct requirements for satellites technical proposal. They could also design a satellite using statistical models. Analysis satellite orbit and choose the proper launch vehicle. In this course students also will inform about one of the basic subsystems of every spacecraft: attitude determination and control subsystem (ADCS), they know how to select the basic elements and design an efficient ADCS..

DESCRIPTION OF THE COURSE: Main topics: An introduction to system engineering: system engineering dimensions, Space Mission and its basic elements, satellites categories, satellites design methods' specifications, statistical satellite design model, orbital analysis, attitude determination and control subsystem of a satellites introduction and design.

PREREQUISITES: Orbital Mechanics, Satellites and their applications, Space Environments

TEACHING METHODS: Lectures, using PowerPoint slides, case studies and seminars.

METHOD OF ASSESSMENT: Exam

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. B. N. Agrawal, Design of Geosynchronous Spacecraft, Prentice Hall, 1986. 2. AIAA Aerospace Design Engineers Guide, AIAA, 1993. 3. B.P. Blasingame, Astronautics, McGraw Hill, 1964. 4. B.A. Campbell and S.W. McCandless Jr., Introduction to Space Sciences and Spacecraft Applications, Gulf, 1996. 5. C.R. Chetty, Satellite Technology and Its Applications, TAB Books, 1991. 6. W.R. Corliss, Scientific Satellites, SP-133, NASA, 1967. 7. M. Davies, editor, The Standard Handbook for Aeronautical and Astronautical Engineers, McGraw-Hill, 2003. 8. M. Davidoff, The Satellite Experimenter's Handbook, American Radio Relay League, 1990. 9. P. Fortesque and J. Stark, Spacecraft Systems Engineering, Wiley, 1995. 10. M.D. Griffin and J. R. French, Space Vehicle Design, AIAA, 1991.

DESCRIPTION OF THE COURSE

Name of the course: **Hands-on Training - Project**	Code: **BASEe34**	Semester: 7
Type of teaching: Seminars (S) Laboratory work (LW) Course Project	Hours per semester: L – 0 hours S – 15 hours LW – 45 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Hristian Panaiotov, PhD (FT), tel.: 965 659518, e-mail: hristian@tu-plovdiv.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: 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 goal of the course is to give the students tangible understanding of the satellite design, the basic subsystems interconnection and functionality. Through this work-shop with the help of instructor, designed tool-boxes and software packages students assemble a CubeSat model, run and test it.

DESCRIPTION OF THE COURSE: Main topics: introduction to digital communication, General Concepts, CubeSat hands-on Training Package ADCS introduction, Arduino, Motor Driver, Sensor and Wireless, Assemblage, software results.

PREREQUISITES: (in parallel) Satellite Design 1

TEACHING METHODS: Interactive Instructions using PowerPoint slides, individual hands-on training activities..

METHOD OF ASSESSMENT: Practical activities (60%) and Test reports (40%)

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Course power points and activities instructions.

DESCRIPTION OF THE COURSE

Name of the course: **CAE analisys**	Code: **BASEe35**	Semester: 7
Type of teaching: Lectures (L) Laboratory work (LW) Course work (CW)	Hours per semester: L – 15 hours S – 0 hours LW – 30 hours	Number of credits: **5**

LECTURER(S):
Assoc. Prof. Eng. Konstantin Kamberov, PhD (FIT), tel.: 965 2574, e-mail: kkamberov@tu-sofia.bg, Assist Prof. Eng. Blagovest Zlatev, PhD (FIT), tel. 965 2574, e-mail: bzlatev@3clab.com
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: After completing the course, students should have knowledge about the modern CAE technologies, used for completing engineering analyses in research and development of product and processes and abilities to apply methods and technical tools of virtual engineering and especially, engineering simulations, to analyse simulation results and perform optimization of industrial products and systems, to acquire new knowledge and skills.

DESCRIPTION OF THE COURSE: Students obtain a basic understanding of applying technologies of virtual engineering and virtual prototyping. The strategies and techniques to perform engineering analyses through contemporary software tools are in the focus of this course. A special focus is set up also over practical applicability in the product development process in mechanical engineering.

PREREQUISITES: Advanced Mathematics, Engineering Mechanics, Strength of Materials and Machine Elements Design. Material Science..

TEACHING METHODS: Lectures 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 computer test during exam session.

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:
1. Тодоров, Г., Камберов, К., Виртуално инженерство, София, 2015; 2. Камберов, К., Тодоров, Г., Инженерни анализи, Изд. Direct Services, София 2018, ISBN 978-619-7171-63-1.; 3. Zienkiewicz, O. C. & Taylor, R. L., 2000. The Finite Element Method. Fifth ed. Oxford: Butterworth-Heinemann; 4. de Borst, R., Crisfield, M. A., Remmers, J. J. & Verhoosel, C. V., 2012. Non-linear Finite Element Analysis of Solids and Structures. Second ред. Chichester: John Wiley & Sons; 5. Ciarlet, P. G., 2003. Handbook of Numerical Analysis. s.l.:Elsevier Science B.V.; 6. Cook, R. D., Malkus, D. S., Plesha, M. D. & Witt, R. J., 2002. Concepts and Applications of Finite Element Analysis. 4th edition ред. New York: John Wiley & Sons; 7.Hellen, T. K. & Becker, A. A., 2013. Finite Element Analysis for Engineers - A Primer. 1 ред. London: NAFEMS.

DESCRIPTION OF THE COURSE

Name of the course: **Space Launch Systems**	Code: **BASEe36**	Semester: 7
Type of teaching: Lectures (L) Seminars (S) Laboratory work (LW)	Hours per semester: L – 15 hours S – 0 hours LW – 45 hours	Number of credits: **6**

LECTURER(S):
Assoc. Prof. Eng. Hristian Panaiotov, PhD (FT), tel.: 965 659518, e-mail: hristian@tu-plovdiv.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: This course aims to introduce basic elements of a typical space launch site; getting students familiar with the criteria of launch site location, providing classifications of space launch vehicles, introducing main subsystems of space launch vehicles, to give students basic knowledge about conceptual design of space launch vehicles.

DESCRIPTION OF THE COURSE: Main topics: An introduction to space launch site; space launch site location; space launch vehicle classifications; single stage to orbit; main subsystems of space launch vehicles; space launch vehicle conceptual design.

PREREQUISITES: System Engineering, Aerospace Structures and Elements, Space Propulsion Systems

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

METHOD OF ASSESSMENT: Exam (70%), lab work (30%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Hopkins, International reference guide to space launch systems, 2004; 2. V.Malishev, Aerospace Vehicle Control, 1995; 3. C.Kluever, Spaceflight Dymamics,2018.

DESCRIPTION OF THE COURSE

Name of the course: Engineering and Transport Logistics	Code: **BASEe37**	Semester: VII
Type of teaching: Lectures (L) Seminar work (S) Laboratory work (LW) Course work (CW)	Hours per semester: L – 30 hours S – 15 hours LW – 15 hours	Number of credits: **5**

LECTURER(S):
Prof. Eng. Svetla Stoilova, DSc (FT), tel.: 965 3922, e-mail: stoilova@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 related to organization and management of transport-logistics systems; design, modelling and analysis of transport flows in a multimodal transport network; supply chain analysis, engineering and management; development and evaluation of transport -logistics strategies and technologies.

DESCRIPTION OF THE COURSE: Main topics: Macro logistic transport systems and supply chain management; Transport flows and transport networks. Transportation routing; Transport logistics equipment; Transport logistics infrastructure and terminals; Cargo storage and distribution systems; Interaction of transport and warehouse logistics; Inventory management; System analysis and modelling in transport logistics; Transport and logistics design and management. Development and analysis of transport and logistics strategies; Decision Making methods in Multimodal Transport Systems; Risk management; Demand forecasting in transport logistics

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

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

METHOD OF ASSESSMENT: Final exam in the 7th semester session (60%), two control tests during the semester (total 20%), seminar and laboratory work (10%), coursework (10%)

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:
1. Boukachour, J., A. Benaini. Transport and Logistics Planning and Optimization, IGI Global, 2023, 330 p.; 2. Joel D. Wisner, Keah-Choon Tan, G. Keong Leong. Principles of Supply Chain Management: A Balanced Approach, Cengage Learning, 2022, 648 p.; 3. John L. Supply Chain Management and Transport Logistics (Routledge Advanced Texts in Economics and Finance), 2011, 560 p.; 4. Gwynne R., S. Grinsted. The Logistics and Supply Chain Toolkit: Over 100 Tools for Transport, Warehousing and Inventory Management, Kogan Page; 2024, 464 p.; 5. Mangan, J., Chandra L., A. Calatayud. Global Logistics and Supply Chain Management. Wiley,2020, 336 p.;6. Turkay Y. Logistics and Supply Chain Management: Fundamentals and Strategies, Kindle Edition, 2023, p.159

DESCRIPTION OF THE COURSE

Name of the course: **Intellectual property policy**	Code: **BASEe38.1**	Semester: 7
Type of teaching: Lectures (L))	Hours per semester: L – 30 hours	Number of credits: 3

LECTURER(S):
Prof. Mincho Hristov (SF), tel.: 965 2180, e-mail: Mincho_hristov@tu-sofia.bg
Assoc. Prof. Ralitza Dimitrova, PhD (FM), tel.: 965 2990, e-mail: rvd@tu-sofia.bg
Assist Prof. Anna Penkova, PhD, tel.: 965 2180, e-mail: a.penkova@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective 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: After completing the course, students should be able to understand and apply in practice the policies in the field of modern information technology and intellectual property, as well as to implement in their professional activity the knowledge about the different types of Intellectual property related to outer space activities, licensing and selling, and protection of IP.

DESCRIPTION OF THE COURSE: The discipline is divided into two modules. In the first module (15 hours) the main topics are: Policies in the field of intellectual property, Global society and new technologies, The role of information in the modern world, Artificial intelligence and intellectual property, Innovation and intellectual property, Corporate and National Security. The second module encompasses the following topics: Types of Intellectual property, related to outer space activities; licensing an selling of IP; protection of IP; Specific issues of licensing, selling and protection og IP, related to outer space activities (balans between protection of scientific nad technological innovations and protection of data, generated by satellites); IP and European Space Agency, etc.

PREREQUISITES: Management theory, Informatics, Management.

TEACHING METHODS: Lectures, using slides, case studies, laboratory and course work, work in teams, protocols and course work description preparation and defence.
METHOD OF ASSESSMENT: Two midterm and end-of-semester written ongoing assessments.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: Denchev, S., Information and security, S., 2019, Semerdzhiev, Ts., Information security and protection, S., 2012, Hristov, M., Globalistics, S., 2018, Tuzharov, H., Basic concepts of the information society, S., 2007, Michev, S., Security risks in the information society, S., 2015, Hristov, M., Sociology, S., 2018, Markovski V. "Information warfare and international law", 2020.Nikolova, T., N. Krushkov, Intellectual property in Digital Environment, Sofia: Publishing House of UNWE, 2018 (in Bulgarian); 3. Aplin, T. Research Handbook on Intellectual Property and Digital Technologies (Research Handbooks in Intellectual Property series) Edward Elgar Publishing, 2020; Samuelson, Pamela, 'Intellectual Property Meets the Internet', in Rochelle Dreyfuss, and Justine Pila (eds), *The Oxford Handbook of Intellectual Property Law*, Oxford Handbooks (2018; online edn, Oxford Academic, 10 May 2017 Y. Zhao, Space Commercialization and the Development of Space Law, Space Pol., 2020; M. Chrysaki, The sustainable commercialisation of space: the case for a voluntary code of conduct for the space industry, Space Policy, Volume 52, May 2020; Zhijie Chen, Yun Zhao, Intellectual Property Protection in Outer Space: Conflict in Theory and Application in Practice,Space Policy, Volume 61, August 2022

DESCRIPTION OF THE COURSE

Name of the course: **Professional Ethics**	Code: **BASEe38.2**	Semester: **7**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30hours T – 0 hours LW – 0 hours	Number of credits: **3**
Course project (CP)	Code: **BASEe38.2**	Number of credits: **0**

LECTURER(S):
Assoc. Prof. Irina Georgieva, PhD (FM), tel.: 965 2180, e-mail: igeorgieva@tu-sofia.bg
Assist. Prof. Bilian Marinov, PhD (FM), tel.: 965 2990, e-mail: bilinic@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory elective subject from the curriculum / curricula 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, students should be able to apply knowledge of the basic principles and approaches in the ethical analysis of professional behavior, at personal and organizational levels. The discipline supports the development of social and communicative competences; stimulates the capacity for moral reasoning and ethical sensitivity in choosing appropriate behavior, especially in resolving specific conflicts and moral dilemmas in professional contexts.

DESCRIPTION OF THE COURSE: The main topics concern: Professional ethics as a branch of applied ethics; Ethical standards and moral responsibility in the professions; The moral development of the individual and manifestations in business behaviour; Moral conflicts, ethical dilemmas and resolutions; Ethical behaviour in organizations, creative professions; Codes of ethics in the professions; Loyalty and trust; Ethical communication: specific issues for the engineering professions; Cross-cultural applied ethics; Ethics in technology, globalization: contemporary issues.

PREREQUISITES: General knowledge of humanities from the secondary education in the field of "Philosophy", "Ethics", "Logic", "Psychology" and / or "Law".

TEACHING METHODS: Lectures, using slides, discussions on case studies from global practice, work tests & surveys.

METHOD OF ASSESSMENT: One-hour assessment at the end of semester (80%), presence & participation in discussions (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY:
1. Donahue, W. E. Professional Ethics: A Competency-Based Approach to Understanding and Applying Professional Ethics, ISBN-13: 979-8498665092, 2021; 2. Brooks, L. , Dunn, P. Business and Professional Ethics. Publ.: Cengage Learning, 9th Ed., 2020; 3. Subramanian, R. Professional Ethics. Oxford University Press; 2nd Ed., 2017; 4. Gaur, R. R., Sangal, R., Bagaria, G. P. A Foundation Course in Human Values and Professional Ethics. Publ.: Excel Books, ISBN-13: 978-8174467812, 2010; 5. Koehn, D. The Ground of Professional Ethics, N.Y., L., Routledge, 1994.

DESCRIPTION OF THE COURSE

Name of the course: **Space Project Management, Law and Regulations**	Code: **BASEe38.3**	Semester: 7
Type of teaching: Lectures (L)	Hours per semester: L – 30 hours	Number of credits: 3

LECTURER(S):
Prof. Eng. Ognyan Andreev, PhD (FM), tel.: 965 3529, e-mail: oandre@tu-sofia.bg
Assoc. Prof. Ralitza Dimitrova, PhD (FM), tel.: 965 2990, e-mail: rvd@tu-sofia.bg
Technical University of Sofia

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

AIMS AND OBJECTIVES OF THE COURSE: After completing the course, students will be able to apply the basic methods and tools of project management, the knowledge of which is a mandatory condition for their successful management in the field of aerospace engineering, as well as their knowledge and skills in the field of space law to solve problems in his professional activity.

DESCRIPTION OF THE COURSE: The main topics concern iissues related to the nature and main tasks of project management, the main groups of processes carried out during the project life cycle, the project management knowledge areas, as well as the approaches, methods are considered. and the techniques used to implement and manage the processes during the individual stages of the life cycle, their justification, selection and evaluation of the project proposal, etc. under. A second group of topics is related to an introduction to space law; sources of space law - international agreements, conventions, resolutions of the UN General Assembly resolutions and rules of international organizations, national resolutions resolutions; Principles concerning outer space; Preservation of space and Earth; Liability for damages caused by space objects; Settlement of disputes, Rescue of astronauts; Use of space-related technologies, etc.

PREREQUISITES: "Fundamentals of Management", "Human Resource Management", "Finance", "Fundamentals of Law", etc..

TEACHING METHODS: Lectures, using slides, case studies.

METHOD OF ASSESSMENT: Two written tests at the middle and end of the semester.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: Andreev, O., Developing and Managing Projects. Managing Research Teams (in Bulgarian) http://eu-learn.tu-sofia.bg/; Kerzner, H. (2022), Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Wiley Publ., 13 th ed.; PMI, USA, (2021). A Guide to the Project Management Body of Knowledge (PMBOK\ Guide), 7th ed.; Wysocki, R. (2019). Effective Project Management: Traditional, Agile, Extreme, Hybrid. Wiley Publ., 8th ed.; Vidin, B. International Law, S:Ciela, 2020 (in Bulgarian); Hofmann, M. And Masson-Zwan, T. Introduction to Space Law, by. (Fourth Edition. Kluwer Law International B.V., Alphen aan den Rijn. 2019; Dunk, F.V.d. (ed.), Handbook of Space Law, Research Handbooks in International Law series, Northampton, Edward Elgar, 2015; Carpanelli E. and Cohen B., paper entitled: "Interpreting Damage Caused by Space Objects under the 1972 Liability Convention", published in Proceedings of the International Institute of Space Law, 2013, Eleven International Publ.

DESCRIPTION OF THE COURSE

Name of the course: **Satellite Design 2**	Code: **BASEe39**	Semester: 8
Type of teaching: Lectures (L) Seminars (S) Laboratory work (LW)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: **6**

LECTURER(S):
Assoc. Prof. Eng. Hristian Panaiotov, PhD (FT), tel.: 965 659518, e-mail: hristian@tu-plovdiv.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 goal of the course is to give the students basic knowledge of the subsystems of a satellite and their design models. Students at the end of this course are supposed to know main satellites subsystems, their functionality, their parts, categories and their design parameters and design models.

DESCRIPTION OF THE COURSE: Main topics: Satellite Power Generation Subsystem (PG), Control and Data-Handling Subsystem (C&DH), Structure (STR), Communication Subsystem (CS), Telemetry and Telecommand (TT&C), Thermal Control (TC).

PREREQUISITES: Satellite Design 1

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

METHOD OF ASSESSMENT: Exam (70%), lab work (30%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY:
1. B. N. Agrawal, Design of Geosynchronous Spacecraft, Prentice Hall, 1986. 2. AIAA Aerospace Design Engineers Guide, AIAA, 1993. 3. B.P. Blasingame, Astronautics, McGraw Hill, 1964. 4. B.A. Campbell and S.W. McCandless Jr., Introduction to Space Sciences and Spacecraft Applications, Gulf, 1996. 5. C.R. Chetty, Satellite Technology and Its Applications, TAB Books, 1991. 6. W.R. Corliss, Scientific Satellites, SP-133, NASA, 1967. 7. M. Davies, editor, The Standard Handbook for Aeronautical and Astronautical Engineers, McGraw-Hill, 2003. 8. M. Davidoff, The Satellite Experimenter's Handbook, American Radio Relay League, 1990. 9. P. Fortesque and J. Stark, Spacecraft Systems Engineering, Wiley, 1995. 10. M.D. Griffin and J. R. French, Space Vehicle Design, AIAA, 1991.

DESCRIPTION OF THE COURSE

Name of the course: **Satellite System Integration and Tests**	Code: **BASEe40**	Semester: 8
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours S – 0 hours LW – 30 hours	Number of credits: **6**

LECTURER(S):

Assoc. Prof. Eng. Krasin Georgiev, PhD (FT), tel.: 965 3124, e-mail: krasin@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 goal of the course is to provide students with the knowledge and skills necessary to understand the process of assembling, testing, and validating satellite systems to ensure readiness for launch and operation.

DESCRIPTION OF THE COURSE: Main topics are as follows. Integration techniques: students gain hands-on experience in integrating satellite subsystems and components into a functional system in a simulated cleanroom environment. Testing procedures: Students learn about the different types of tests conducted during satellite integration and testing, including environmental tests (vibration, thermal vacuum, electromagnetic compatibility), functional tests, and performance tests. Test equipment and facilities: specialized equipment and facilities used for satellite testing, including vibration tables, thermal vacuum chambers, and electromagnetic interference chambers. Data analysis: how to analyze test data to evaluate the performance of satellite systems and identify any issues or anomalies that need to be addressed.

PREREQUISITES: Space Environment, Satellite Design, Hands-on Training – Project.

TEACHING METHODS: Lectures, using PowerPoint slides and demonstratons, laboratory work.

METHOD OF ASSESSMENT: Exam (70%), laboratories (30%).

INSTRUCTION LANGUAGE: English.

BIBLIOGRAPHY: 1. Peter Fortescue, Graham Swinerd, and John Stark, Spacecraft Systems Engineering, 4th edition, Wiley, 2004. 2. NASA SSRI Knowledge Base | Integration and Test.

DESCRIPTION OF THE COURSE

Name of the course: **Entrepreneurial Leadership**	Code: **BASEe41**	Semester: **8**
Type of teaching: Lectures (L)	Hours per semester: L – 30 hours	Number of credits: **4**

LECTURER(S):

Assoc. Prof. Dr. Eng. Dimcho Dimov, tel.: 965 2259, e-mail: ddimov@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training students for the Bachelor's degree program, specialty "Aerospace Engineering" professional field 5.5. Transport, shipping and navigation.

AIMS AND OBJECTIVES OF THE COURSE: The "Entrepreneurial Leadership" course aims students to acquire key entrepreneurial and managerial competencies for forming, building, developing, organizing and managing highly effective project teams for the implementation of entrepreneurial activity within various projects and organisational units in the aerospace industry. Students will develop their leadership competencies for effective and efficient management of innovative entrepreneurial teams, for organizing and managing resources in enterprises and will be able to apply in practice modern methods and models for high organizational performance on a project basis.

DESCRIPTION OF THE COURSE: The discipline "Entrepreneurial Leadership" provides students with knowledge about modern trends in transformational entrepreneurial leadership and flexible team work organization in real and virtual entrepreneurial environment. Through the discipline, students will be able to gain practical knowledge of the role of the manager at the organizational and project level, as an entrepreneur, who is a key factor in the success of modern smart innovative enterprises. Topics cover organizational leadership in the digital economy, entrepreneurship and innovation, managing high-performing innovative teams, virtual project teams, performance management, mentoring and coaching, change management, and more.

PREREQUISITES: Organisational Behaviour, Human Resource Management, Entrepreneurship, Innovation Manangement.

TEACHING METHODS: Lectures using presentations, multimedia applications and programs, role-playing and business games, working in autonomous groups, group discussions and solving cases.

METHOD OF ASSESSMENT: Written work during the semester - 70%; active participation of students in the interactive activities and assignments on the content of the course during the semester - 30%.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY: Ashton, J., 2021. The Nine Types of Leader. How the Leaders of Tomorrow Can Learn from The Leaders of Today. KoganPage. Armstrong, M., 2016. Armstrong's Handbook of Management and Leadership for HR. Developing Effective People Skills for Better Leadership and Management. KoganPage. Cameron, E., M. Green, 2017. Essential Leadership. Develop Your Leadership Qualities Through Theory and Practice, KoganPage. Gordon, J. 2018. The Power of a Positive Team: Proven Principles and Practices That Make Great Teams Great. Wiley. Hansen, J., 2012. First Man: The Life of Neil A. Armstrong. Simon & Schuste. Hayward, S., 2018. The Agile Leader. How to Create an Agile Business in the Digital Age. KoganPage. Hawkins, P., 2021. Leadership Team

Coaching. Developing Collective Transformational Leadership. KoganPage. Mastrangelo, A., 2015. Entrepreneurial Leadership A Practical Guide to Generating New Business. Praeger. NASA Entrepreneurs Challenge 2023. NASA System Engineering Competency Model. NASA Systems Engineering Leadership Program. Pellerin, C., 2009. How NASA Builds Teams. Peterson, J., 2020. Entrepreneurial Leadership: The Art of Launching New Ventures, Inspiring Others, and Running Stuff. HarperCollins Leadership

DESCRIPTION OF THE COURSE

Name of the course: **Statistics**	Code: **BASEe42.1**	Semester: **8**
Type of teaching: Lectures (L)	Hours per semester: L – 30 hours	Number of credits: **4**

LECTURER(S):
Prof. Krasimira Prodanova, PhD (FAMI), tel.: 965 3355, e-mail: kprod@tu-sofia.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Elective 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: The aim of the course is to introduce students to Mathematical Statistics, to familiarize them with basic concepts, properties and methods of statistical estimations.

DESCRIPTION OF THE COURSE: The main topics concern: Descriptive statistics, Point estimations and Intervals estimations, Testing of statistical hypothesis, Analysis of variance, Regression analysis.

PREREQUISITES: Mathematics I & II.

TEACHING METHODS: Traditional lectures as well as interactive lessons using multimedia, labs using Matlab and Maple software.

METHOD OF ASSESSMENT: Continuous assessment over the self-study.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY:

1. Славкова М., КМС, София, 2011.
2. Проданова К., Въведение в статистическите методи, Сиела, 1998,
3. K.Prodanova, Lectures notes in Statistics, TU, 2008.
4. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, 2020.

DESCRIPTION OF THE COURSE

Name of the course: **Failure analysis**	Code: **BASEe42.2**	Semester: **8**
Type of teaching: Lectures (L)	Hours per semester: L – 30 hours	Number of credits: **4**

LECTURER(S):
Prof. Krasimira Prodanova, PhD (FAMI), tel.: 965 3355, e-mail: kprod@tu-sofia.bg
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COURSE STATUS IN THE CURRICULUM: Elective 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: The aim of the course is to introduce students to Failure analysis, to familiarize them with basic concepts, properties and methods of failure estimations.

DESCRIPTION OF THE COURSE: The main topics concern: Failure analysis lifecycle, Failure statistics, Methods and tools for failure analysis, Testing of hypothesis, Failure Analysis Engineer, etc.

PREREQUISITES: Mathematics I & II.

TEACHING METHODS: Traditional lectures as well as interactive lessons using multimedia, labs using specialised tools for failure analysis.

METHOD OF ASSESSMENT: Continuous assessment over the self-study.

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY:

5. Marius Bâzu, Titu Băjenescu, Failure Analysis: A Practical Guide for Manufacturers of Electronic Components and Systems, ISBN:9780470748244, DOI:10.1002/9781119990093.
6. Titu-Marius BĂJENESCU, Failure Analysis and Reliability Aspects of Electronic Components, March 2024, DOI:10.46904/eea.24.72.1.1108006 .
7. Case Studies in Engineering Failure Analysis, Journal homepage: www.elsevier.com/locate/csefa, Article in Case Studies in Engineering Failure Analysis · January 2013, DOI: 10.1016/S2213-2902(13)00028-X.
8. Susan Li, Failure Analysis Challenges for Chip Scale Packages (2023 Update), November 2023, DOI:10.31399/asm.cp.istfa2023tpz1.