DESCRIPTION OF THE COURSE

Name of the course: **Aircraft Aerodynamics**	Code: **BpAE01**	Semester: **5**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 45 hours T – 0 hours LW – 15 hours	Number of credits: **6**
Course project (CP)	Code: **BpAE06**	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Eng. Hristian Panayotov, tel.: 659 518, e-mail: hristian@tu-plovdiv.bg
Assist. Prof. Eng. Stanimir Penchev, PhD (FMEIM), tel.: 659 632, e-mail: spenchev@tu-plovdiv.bg
Technical University of Sofia Branch Plovdiv

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

AIMS AND OBJECTIVES OF THE COURSE: The objective of this course is the students gain knowledge of different theoretical and applied parts of the aerodynamics providing aircraft parts aerodynamics and coupling learning. At the end of the course the students are expected to apply the aerodynamics design methods and investigate construction and exploitation factors influence on the aerodynamics aircraft performance.

DESCRIPTION OF THE COURSE: The main topics concern: Fluid properties and fundamental of fluid mechanics. Flow kinematics and flow dynamics. Supersonic flows and the formation of shock waves, Prandtl-Meyer expansions and nozzle flow. Incompressible flow over airfoils and finite wings, aerodynamic characteristics of wings. Supersonic aerofoil section characteristics, supersonic wings. An introduction to transonic aerofoil and wing aerodynamics - area rule. Wing High Lift devices: flaps, slots, slats and flaperons. Drag induced devices, spoilers. Boundary Layer control. Flow around a body. Interference effects. Aircraft lift, drag polar and finesses. Pitching, yaw and roll moment. Ground effect. Propellers. Blade element theory, performance. Interference effects. Introduction to helicopter aerodynamics. Unsteady flow around the airplane, airframe flexibility effects.

PREREQUISITES: Mathematics, Physics, Mechanics, Fluid Mechanics, Thermodynamics and Heat Transfer.

TEACHING METHODS: Lectures, using slides, laboratory works with protocols preparation and defence, demo-programs, course project.

METHOD OF ASSESSMENT: Semester exam (70%), laboratory work (10%), tests (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Гешев, Д.Н.,Аеродинамика на летателните апарати – основен курс, С.,Изд. На ТУ-София, 2018; 2.Маджаров,Б.И.,Аеродинамика на летателните апарати – кратък курс, С.,Мадара-Принт2000; 3.Попов,М., Л.Панов, Хидро-газодинамика, С.,Техника,1980.; 4.Bertin J.J.,M.L.Smith, Aerodynamics for Engineers, Prentice Hall, 2002; 5. Kuethe Arnold M., Chow Chuen-Yen, Bases of aerodynamic design, John Wiley&Sons, Inc., 1998.

DESCRIPTION OF THE COURSE

Name of the course: **Air Navigation I (General navigation)**	Code: **BpAE02**	Semester: 5
Type of teaching: Lectures(L) Seminars (S) Laboratory work (LW)	Hours per semester: L – 30hours S – 15 hours LW – 15 hours	Number of credits: 5

LECTURER(S):
Assoc. Prof. Ph.D. Atanas Nachev, (FME), tel.: 659 514, e-mail: anachev@tu-plovdiv.bg
Assist. Prof. Eng. Dancho Kolibarov, PhD,FME , tel.: 965 593, e-mail: danchokol@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtainBachelor's degree, specialty Aviation technics and technologies, Professional orientation 5.5Transport, shippingand aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Study of the principles and methods of navigation for determining the location of the aircraft with geotechnical means, use of aeronautical maps and determination of coordinates of reference points and the distance between them, flight planning on a route and development of a flight navigation plan taking into account the factors affecting the accuracy of navigation.

DESCRIPTION OF THE COURSE: The course covers the basics of navigation, such as the structure of the solar system, the origin of the seasons, geomagnetism and the function of a magnetic compass, and navigation definitions of key terms. It also addresses the issue of aeronautical charts and various map projections. Determination of directions and distances, speed and flight altitude, influence of wind on the flight of the aircraft, creation of a flight plan and use of the information contained in it, inertial navigation, electronic flight instrument system EFIS and flight management systems FMS. This knowledge is presented in a logical sequence step by step.

PREREQUISITES: Mathematics, Physics, Aerodynamics of aircraft, Electronics, Meteorology

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

METHOD OF ASSESSMENT: Final two-hour assessment/test at the end of semester (80%), seminars and laboratories with four progress tests (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY:1.ZayakovV., ShalamanovaI., Air navigation.Technical University Sofia, 2001, ISBN 954-9961-05-2; 2. General Navigation. ATPL Ground Training Seriesby CAE Oxford Aviation Academy.

DESCRIPTION OF THE COURSE

Name of the course: **Technology of the Aircraft Manufacturing**	Code: **BAE03**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 45 hours S – 15 hours LW – 15 hours	Number of credits: 6

LECTURER(S):
Assoc. Prof. Ph.D. Atanas Nachev, (FME), tel.: 659 514, e-mail: anachev@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective facultative subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty Aeronautical Engineering, Professional orientation 5.5 Transport, Shipping, Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Purpose of the subject is the students make a profound study of the technology of the aircraft's manufacturing.

DESCRIPTION OF THE COURSE: Main topics: Main notions and definitions – aircrafts and aircraft engines as objects, general and particular technological processes, technological methods and means; Technological process of manufacture – main principles of dividing, main structure, classification; Factors influenced on the technological processes; Geometric performances of the products; Technological methods and means for insurance of the interchangeability – classification, runners, patterns, standard surfaces, assemblies; Quality monitoring; Technological process design of the component treatment. Manufacturing of the sheet material components, profiles and pipes (tubes); Castings, forged and rolled details mechanical machining; Chemical and electrochemical treatment methods; Protective coating eying on; Technological processes mechanization and automation; Aircrafts and aircraft engines assembly and mounting – assembly methods and bases choice; technological processes on units, panels, sections and sets assembly; Aircraft entire assembly; Aviation product testing.

PREREQUISITES: Material Science 1; Material Science 2 (Aviation Materials); Aircraft Aerodynamics; Flight Dynamics; Aircraft structures 1.

TEACHING METHODS: Lectures, using projector; laboratory works with protocols preparation and defence; consultations.

METHOD OF ASSESSMENT: Written examination (80%), laboratory works (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Барвинок В.А., П.Я. Пытьев, Е.П. Корнев "Основы технологии производства ЛА", Москва, Маш., 1995г; *2.* Барвинок В.А. "Сборочные, монтажные и испытательные процессы в производстве ЛА", Москва, Маш., 1996г; *3.* Братухин А.Г., Ю.Л.Иванов, ... "Современные технологии авиостроения", Москва, Маш., 1999г; *4.* Бюшгенс Г.С., О.А. Кузнецов, ... "Книга 1 Аэродинамика, динамика и прочность, Том IV-21 Самолеты и вертолеты, Машиностроение Энциклопедия в сорока томах", Москва, Маш., 2002г; *5.* Гарькавый А.А. "Производство деталей авиационных двигателей", Москва, Маш., 1977г; *6.* Григорьев В.П. "Технология самолетостроения", Москва, Оборонгиз, 1960г; *7.* Сулима А.М., А.Л. Носков, ... "Основы технологии производства ГТД", Москва, Маш., 1996г; *8.* Ершов В.И., ... "Теоретические основы сборки", Москва, МАИ, 1993г; *9.* AIRCRAFT Maintenance & Repair, Sixth Edition.

DESCRIPTION OF THE COURSE

Name of the course: **Piston engines**	Code: **BpAE04**	Semester: **5**
Type of teaching: Lectures (L) Laboratory work (LW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **5**

LECTURER(S):
Prof. Eng. Valyo Nikolov, PhD, (FME), tel.: 659 594 XXXX, e-mail: vnikolov@tu-plovdiv.bg
Technical University of Sofia, Plovdiv Branch

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

AIMS AND OBJECTIVES OF THE COURSE: The students must to know the basics of ICE theory, mathematical modeling of the process taking place in the engines, the methods of thermal calculations and determination of the basic dimensions, taking their characteristics, etc..

DESCRIPTION OF THE COURSE: Origin, development and prospects for application of internal combustion piston engines (ICE) in aviation. Main conclusions from the thermodynamics of internal combustion engines (ICE). Ideal thermodynamic cycles used in ICE. Actual cycles and processes occurring in ICE. Indicators characterizing the perfection of ICE. Indicator and effective indicators of ICE. Mixture formation in gasoline engines. Characteristics of aviation ICE. Regulation of the modes of operation of aviation ICE. Types of regulators used in aviation ICE. Kinematics, dynamics and balancing of piston aviation ICE. Construction of the body parts of aviation ICE. Power mechanism of aviation ICE. Gas distribution mechanism of aviation ICE. Combustion systems of aviation ICE. Cooling systems of aviation ICE. Aviation ICE lubrication systems. Ignition and starting systems of aviation ICE..

PREREQUISITES: Fluid mechanics; Mechanics; Strength of materials; Thermodynamics and heat transfer; Aircraft Part I; Higher Mathematics Part III and etc..

TEACHING METHODS: Lectures using multimedia, slides and others materials. Laboratory works for which reports are made and the reports are checked by the teacher..

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (80 %), laboratories (20 %).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Димитров П., Учебник по „Теория на двигателите с вътрешно горене“, Издателство на Технически Университет – София, 2000; 2. Маслинков С. и кол., Теория на двигателите с вътрешно горене, Издателство „Техника“, София, 1985; 3. Бояджиев, К. Г и кол., Конструкция, проектиране и изчисляване на ДВГ, Издателство „Техника“, София, 1984; 4. Костов В., Николов В., Димитров Е., Амбарев К., Учебник по “Авиационни бутални двигатели”, Издателство „Хоризонти“, Пловдив, 2014; 5. Димитров, П. И., Ръководство за лабораторни упражнения по „Теория на ДВГ“, Технически Университет – София, 1999; 6. Николов В., Амбарев К., Ръководство за курсова работа по „Теория на ДВГ“, “Топлинно изчисляване на ДВГ с интерактивна програмна система”. Издателство „Хоризонти“, Пловдив, 2014..

DESCRIPTION OF THE COURSE

Name of the course: **RADIOTECHNICS BASIC**	Code: **BpAE05**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW) / Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: 5

LECTURER(S):

Assist. Prof. Eng. Stoyan Avramov, PhD, TATT (FMU), e-mail: stav@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 Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to create in students an idea and the necessary knowledge of: information, digital and analog signals and systems, basic methods for processing and analysis of signals in the frequency and time domain, basic processes for signal processing (amplification, modulation, demodulation, filtration, coding), as well as for basic methods for research of analog and digital linear, nonlinear and parametric systems.

DESCRIPTION OF THE COURSE: Main topics: Amount of information, Entropy; Basic information about signals - types, mathematical description, physical interpretation; Basic information about systems - types and features; Spectral analysis of analog and discrete signals; Random signals and noises; Correlation analysis of signals; Application of correlation analysis in aircraft guidance and recognition - directional radar antennas, principle of operation of radiolocation stations, application of correlation analysis in radiolocation; Filtering the signals in the frequency domain - analog and digital filters, optimal and quasi-optimal filtering; Processes and systems for modulation and demodulation - amplitude, angular, pulse modulation and PCM; Optimal and noise-resistant signal coding

PREREQUISITES: Basic knowledge of Mathematics, Physics, Electrical engineering and Electronics, Analog and Digital Circuits.

TEACHING METHODS: Lectures using slides, laboratory exercises based on testing workbenches and computer simulations of processes and systems.

METHOD OF ASSESSMENT: Written exam (80%), laboratory exercises (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:
1. Ненов Г., Сигнали и системи, Нови знания, София, 2008; 2. Фердинандов Е., Сигнали и системи, Сиела, София, 1999; 3. Kani, A Nagor. Signals and systems, McGraw-Hill Education, 2018; 4. Георгиева В., Петров Пл., Сигнали и системи, Ръководство за лабораторни упражнения, изд. “Кинг” София, 2016.

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **FaSPR05**	Semester: 5
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):
Assoc. Prof. Valentin Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: valdesv@tu-plovdiv.bg
Sen. Lect. Daniel Vladimdirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg
Sen. Lect. Krassimir Djaldeti, PhD (FEA), tel.: 032 659 648, e-mail: krsj@tu-plovdiv.bg
Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg
Lect. Boris Spasov (FEA), tel.: 032 659 647, e-mail: boris_spassov@tu-plovdiv.bg
Technical University of Sofia-Branch Plovdiv
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Equipment and Technologies, Mechatronics Professional orientation 5.1 Mechanical engineering; Transport Equipment and Technologies, Aircraft Equipment and Technologies Professional orientation 5.5 Transport, Shipping and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curricula presume the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризъм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

COURSE DESCRIPTION

Course Title: **English for specific purposes**	Code: **FaBpAE02**	Semester: **5**
Type of Teaching: **Seminars (S)**	Contact hours per semester: **S – 30 hours**	Number of credits: **2**

LECTURERS:	**Telephone:**	**E-mail:**
Sen. Lect. Penka Taneva – Kafelova (FME, English)	0888465545	tanneva@gmail.com
Sen. Lect. Konstantina Nyagolova (FME, English)	0887276513	konstantinanik@yahoo.com
Sen. Lect. Nadya Popova (FME, English)	032 659 707	popovanadia@yahoo.com
Sen. Lect. Anet Arabadjieva (FME, English)	0892231353	anet2003@abv.bg
Lect. Nadezhda Geshanova (FME, English)	0889314932	geshanova@tu-plovdiv.bg
Lect. Dr Daniela Valeva, (FME, English)	0897899039	daniela.valeva89@gmail.com

COURSE STATUS IN THE CURRICULUM: Optional course in the curriculum of the ***Bachelor Degree Programme in Aviation Equipment and Technologies***, Professional qualification 5.5 Transport, Navigation and Aviation, Professional field 5 Technical Sciences.

COURSE OBJECTIVES: The course is targeted at further developing of students' language knowledge and practical skills in their specific professional field.

COURSE DESCRIPTION: The course is taught at language levels determined through placement tests, based on the compulsory foreign language course taken in Year 1 at TU – Sofia. No absolute beginner groups are formed. The course focuses on the further development of the four language skills in the domain of the students' major subject *Aviation Equipment and Technologies*.

PREREQUISITES: Completed compulsory foreign language course **LNG01** and **LNG02** in Year 1.

TEACHING METHODS: Seminars targeted at further development of the four language skills through individual and team work using audio and video, as well as multimedia.

METHOD OF ASSESSMENT: Evaluation is based on continuous assessment and students get a grade at the end of the course.

LANGUAGE OF INSTRUCTION: English

LITERATURE RECOMMENDED:

1. *Technical English, Pearson Longman*
2. *Technical English for Professionals, Mark Ibbotson, Oxford University Press*

DESCRIPTION OF THE COURSE

Name of the course: **Flight Dynamics I**	Code: **BpAE07**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 30 hours T – 0 hours LW – 15 hours	Number of credits: **4**
Course project (CP)	Code: **BpAE13**	Number of credits: **2**

LECTURER(S):

Assoc. Prof. Eng. Hristian Panayotov, tel.: 659 518, e-mail: hristian@tu-plovdiv.bgAssist. Prof. Eng. Stanimir Penchev, PhD (FMEIM), tel.: 659 632, e-mail: spenchev@tu-plovdiv.bg
Technical University of Sofia Branch Plovdiv

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

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to apply the methodology for modeling, simulation and analysis of the aircraft performance and use it to solve engineering problems..

DESCRIPTION OF THE COURSE: The main topics concern: Definition of angles, coordinate systems and equations; Steady level-powered flight; Climb and descend performance; Take-off and landing; Range and endurance; Maneuvering and Flight envelope; Helicopter performance analysis.

PREREQUISITES: Physics; Mathematics; Mechanics; Fluid Mechanics; Aerodynamics of Aircraft; Navigation; Aircraft Structures.

TEACHING METHODS: Lectures, using slides, laboratory works with protocols preparation and defence, demo-programs, course project.

METHOD OF ASSESSMENT: Semester exam (70%), laboratory work (10%), tests (20%) and defence of the course project.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Тодоров М., Динамика на полета: Летателно-технически характеристики на въздухоплавателните средства, 2015, 209, ISBN 978-619-167-170-0. 2. Тодоров М., Ръководство за лабораторни упражнения по Динамика на полета, 2006, 67, ISBN-10: 954-438-561-4. 3. Roskam J., C. Lan, Airplane Aerodynamics and Performance, DARcorporation, Kansas, 2016, ISBN-10 : 1884885446.
4. Hale F., Introduction to Aircraft Performance, Selection and Design, John Wiley&Sons, New York, Stengel R., Flight Dynamics, 2004, ISBN 0-691-11407-2.

DESCRIPTION OF THE COURSE

Name of the course: **Air Navigation II (Radio navigation)**	Code: **BpAE08**	Semester: 6
Type of teaching: Lectures(L) Seminars (S) Laboratory work (LW)	Hours per semester: L – 30hours S – 0 LW – 15 hours	Number of credits: 5

LECTURER(S):
Assist. Prof. Eng. Dancho Kolibarov, PhD,FME, tel.: 965 593, e-mail: danchokol@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Compulsory subject from the curriculum for training of students to obtainBachelor's degree, specialty Aviation technics and technologies, Professional orientation 5.5Transport, shippingandaviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Study of instrument navigation methods, the principle of operation of radio navigation aids and techniques for their use, the purpose and use of global satellite navigation systems (GNSS), radars and modern navigation methods, such as performance-based navigation (PBN).

DESCRIPTION OF THE COURSE: Main topics: Non-direction Radio Beacons and Automatic Direction Finder (NDB / ADF), VOR / DME, Instrument Landing Systems (ILS / MLS), RADARs, Global Navigation Satellite Systems (GNSS) and Performance-based Navigation (PBN)

PREREQUISITES: General navigation, Radio technics, Electronics.

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

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (82%), laboratories (18%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY:1.ZayakovV., ShalamanovaI., Air navigation.Technical University Sofia, 2001, ISBN 954-9961-05-2; 2. Radio navigation. ATPL Ground Training Seriesby CAE Oxford Aviation Academy.

DESCRIPTION OF THE COURSE

Name of the course: **AVIONICS I**	Code: **BpAE09**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW) / Seminars (S) Course work (CW)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: 4

LECTURER(S):
Assist. Prof. Eng. Stoyan Avramov, PhD, TATT (FMU), e-mail: stav@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 Aeronautical Engineering, Professional orientation 5.5 Transport, Navigation and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The course aims is to acquaint students with aviation instruments and automatic aircraft systems. The instruments controlling the operation of the engine and the individual systems, the aneroid - membrane instruments, gyroscopic instruments, navigation instruments and systems and the autopilot are considered. The assimilation of the material is supported by conducting a sufficient number of laboratory exercises. The semester grade is based on an exam, current grades from exams during the semester and control exercises conducted during the semester.

DESCRIPTION OF THE COURSE: The main topics concern: Instruments controlling the operation of the engine and systems, aneroid - membrane instruments, gyroscopic instruments and systems, inertial navigation systems, automatic control systems.

PREREQUISITES: Basic knowledge of Physics; Mathematics; Theoretical foundations of electrical engineering; Theory of automatic control.

TEACHING METHODS: Lectures using slides, laboratory exercises based on testing workbenches and computer simulations of processes and systems.

METHOD OF ASSESSMENT: Written exam (80%), laboratory exercises (20%)

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: David Wyatt, Mike Tooley, Aircraft Electrical and Electronic Systems, Routledge 2018, ISBN: 978-1-138-58960-5; Стоянов Ц.Т. Авиационно оборудване на летателните апарати, ТУ- София, 1995; Стоянов Ц.Т., Бордни системи за автоматично управление на самолета, ТУ-София, 2007; The avionics handbook / edited by Cary R. Spitzer., CRC Press 2001, ISBN 0-8493-8348

DESCRIPTION OF THE COURSE

Name of the course: **Hydraulic and pneumatic actuation**	Code: **BpAE10.1**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 30 hours LW – 15 hours	Number of credits: **4**

LECTURER(S):

Assoc. Prof. Ph.D. Atanas Nachev, (FME), tel.: 659 514, e-mail: anachev@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

COURSE STATUS IN THE CURRICULUM: Elective facultative subject from the curriculum / curricula for training of students to obtain Bachelor's degree, specialty Aeronautical Engineering, Professional orientation 5.5 Transport, Shipping, Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: The main purpose of the subject "Hydraulic and pneumatic actuation" is to provide to the students necessary knowledge on the main issues of the construction solutions, calculation methods, designing and operation of hydraulic and pneumatic machines, elements and main types of actuating systems, used in aeronautical engineering.

DESCRIPTION OF THE COURSE: Main course themes are divided in the two directions: first direction – specification, construction, mode of operation and characteristics of dynamic and positive displacement hydraulic and pneumatic machines. Second direction of themes – cover valves and other elements, used in hydraulic and pneumatic actuating systems and the main types of those type systems, used in transport and aircraft technology.

Students get familiar in practice with this type of machines in time of laboratory work.

PREREQUISITES: Control Theory, Elements of Industrial Automation, Electrical Engineering, Electronics, Computing, Fluid Mechanics, Physics, Thermodynamics, Industrial Manufacturing Systems.

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

METHOD OF ASSESSMENT: Two one-hour assessments at mid and end of semester (80%), laboratories (20%).

INSTRUCTION LANGUAGE: Bulgarian/English

BIBLIOGRAPHY: Vassilev V., Complete subject lectures in pdf format; 2. Grozev G. and all., Hydraulic and Pneumatic Machines and Actuation, S., Technika 1990г. 3. Komitovski M. Valves Used in Hydraulic and Pneumatic Actuating Systems, S., Technika 1985г. 4. Akers A., Gassman M., Smith R, Hydraulic Power System Analysis, Taylor & Francis, NY, 2006. 5. Andrew Parr, Hydraulics and Pneumatics. A Technicians and Engineer's guide

DESCRIPTION OF THE COURSE

Name of the course: **Automatic Control Theory**	Code: **BpAE10.2**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S)	Hours per semester: L – 30 hours S – 0 hours LW – 15 hours	Number of credits: **4**

LECTURER(S):
Assoc. Prof. Dr. Borislav Penev (FEA), tel.: 032-659-527, e-mail: bpenev@tu-plovdiv.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 "Aviation Engineering and Technologies", Professional orientation 5.5 "Transport, shipping and aviation", Field 5 "Technical Sciences".

AIMS AND OBJECTIVES OF THE COURSE: At the end of the course the students are expected to know the basic concepts of the Automatic Control Theory and be able to apply the principles, modelling and methods of the control theory in order to analyze and synthesize automatic control systems. For that purpose the students are expected to be able to use MATLAB and SIMULINK.

DESCRIPTION OF THE COURSE: The main topics concern: Automatic control systems – introduction; Mathematical models of the linear continuous automatic controls systems: Differential equations, Transfer functions, Block diagrams; Time and frequency domains analysis; Stability: Main definitions; Algebraic and Frequency criteria. Stability margins; Performance; Synthesis – classical methods.

PREREQUISITES: Mathematics part I, II and III, Physics, Mechanics part 1 and part II, Electrical Engineering and Electronics, Aircraft aerodynamics.

TEACHING METHODS: Lectures, classical and using slides, laboratory work, work in teams, protocols' preparation and defence.

METHOD OF ASSESSMENT: Two one-hour written assessments at the mid and the end of semester (80%), laboratory work (20%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Ищев, К., Теория на управлението, ТУ-София, София, 2002; 2. Ищев, К., Теория на автоматичното управление, ТУ-София, София, 2007; 3. Åström, K. J. and Murray, R. M., Feedback Systems, Princeton University Press, Princeton, New Jersey 08540, 2009; 4. Ищев, Ал., Т. Пулева, Ръководство за лабораторни упражнения по теория на управлението (част1), ТУ-София, 2005; 5. Пенев, Б., Анализ и синтез на примерни системи за автоматично управление на летателни апарати, ТУ-София, Филиал Пловдив, 2006.

DESCRIPTION OF THE COURSE

Name of the course: **Aircraft I**	Code: **BpAE11.1**	Semester: **6**
Type of teaching: Lectures (L) Laboratory work (LW)/Tutorials (T) Course work (CW)	Hours per semester: L – 45 hours T – 0 hours LW – 15 hours	Number of credits: 6
Course project (CP)	Code:	Number of credits: 0

LECTURER(S):

Assoc. Prof. Eng. Hristian Panayotov, PhD (FME), tel.: 032 659 514, e-mail: hristian@tu-plovdiv.bg

Technical University of Sofia, Plovdiv Branch

COURSE STATUS IN THE CURRICULUM: Elective course from for the bachelor students specialty "Aeronautical Engineering", Faculty of Mechanical Engineering..

AIMS AND OBJECTIVES OF THE COURSE: The aim of the course is to provide students with theoretical knowledge and practical skills about aircraft structures, aircraft loads, main structural elements and basic analysis techniques;.

DESCRIPTION OF THE COURSE: The main topics concern: General data of aircraft; Aircraft Loads; Certification specifications according to EASA; Structural Elements of Aircraft; Wing, Empennage, Fuselage, Landing gears, Aeroelasticity .

PREREQUISITES: Physics, Mechanics, Strength of Materials, Aircraft Aerodynamics, Flight dynamics.

TEACHING METHODS: Lectures, using slides; laboratory works by using computers for calculations and making protocols; home works, consultations..

METHOD OF ASSESSMENT: laboratory works - 30%, written examination - 70 %

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY:

1. Илиев В. Летателни апарати –конструкция и якост. ТУ – София, София, 2002.; 2. Зайцев В. Н., Ночевкин Г. Н. и др. Конструкция и якост на самолетите. Военно издателство, София, 1980.; 3. Бельский В. Л. и др. Конструкция летательных аппаратов. Оборонгиз, Москва, 1963.; 4. Шульженко М. Н. Конструкция самолетов. Машиностроение, Москва, 1971.; 5. Jane's All the World's Aircraft ;.

DESCRIPTION OF THE COURSE

Name of the course: **Aircraft Engines I**	Code: **BpAE12.1**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Course work (CW)	Hours per semester: L – 45 hours S – 0 hours LW – 15 hours	Number of credits: 5

LECTURER(S):
Assoc. Prof. Ph.D. Atanas Nachev, (FME), tel.: 659 514, e-mail: anachev@tu-plovdiv.bg
Technical University of Sofia, Branch Plovdiv

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

AIMS AND OBJECTIVES OF THE COURSE: The objectives of the course are to provide students with knowledge of the basic laws and working processes in aircraft gas turbine engines. This is the basis of the following special disciplines, dealing with aircraft engines′s construction, their operation in flight and maintenance.

DESCRIPTION OF THE COURSE: Being founded upon the referred subjects it reveals general regularities of processes performed in gas turbine engines. The following items are exposed here: inlet; compressor; combustion chamber; gas turbine; exhaust system. The processes attending gas flow through engine components are observed gradually. Parameter calculation methods are presented and the conditions of their cooperative action are suggested. Special attention is paid to flight conditions effect on thrust and specific fuel consumption. Necessary conditions providing stability of running processes are explained. Skills in defining parameters in particular sections and process analysis are built up. Specific features of different types of gas turbine engines and their special parameters are exposed. Working process and structure peculiarities of turbopropeller engines and turboshaft is explained.

PREREQUISITES: The subject is based on the knowledge in "Thermodynamics and Heat Transfer "; “Fluid Mechanics” and “Aerodynamics of aircraft”.

TEACHING METHODS: Lectures, using projector; laboratory works with protocols preparation and defence; consultations.

METHOD OF ASSESSMENT: Written examination (70%), laboratory works (20%), tests (10%).

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Петров С. А., Авиационни двигатели - работен процес и характеристики на газотурбинните двигатели. С., ТУ-София, изд. ЕТ” Актив Комерс”, 2000; 2. Huenecke K., Jet Engines - Fundamentals of Theory, Design and Operation. Crowood Press UK, 2010; 3. Kerrebrock J. L., Aircraft Engines and Gas Turbines. The MIT Press, Massachusetts, USA, 1992; 4. Kroes M. J. and Thomas W. W. Aircraft Powerplants, 9-th ed. Glencoe, McGraw-Hill, USA, 2018; 5. AC65-12A, Airframe&Powerplant Mechanics Powerplant Handbook, FAA.

DESCRIPTION OF THE COURSE

Name of the course: **Sport**	Code: **FaSPR06**	Semester: 6
Type of teaching: Lectures (L) Laboratory work (LW)/Seminars (S) Self-Study (SS)	Hours per semester: L – 0 hours S – 0 hours SS – 30 hours	Number of credits: 1

LECTURER(S):
Assoc. Prof. Valentin Vladimirov, PhD (FEA), tel.: 032 659 646, e-mail: valdesv@tu-plovdiv.bg
Sen. Lect. Daniel Vladimdirov, PhD (FEA), tel.: 032 659 646, e-mail: danielv@tu-plovdiv.bg
Sen. Lect. Krassimir Djaldeti, PhD (FEA), tel.: 032 659 648, e-mail: krsj@tu-plovdiv.bg
Lect. Petar Doganov, PhD (FEA), tel.: 032 659 648, e-mail: pdoganov@tu-plovdiv.bg
Lect. Boris Spasov (FEA), tel.: 032 659 647, e-mail: boris_spassov@tu-plovdiv.bg
Technical University of Sofia-Branch Plovdiv
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curriculum for training of students to obtain Bachelor's degree, specialties Mechanical and Instrument Engineering, Mechanical Equipment and Technologies, Mechatronics Professional orientation 5.1 Mechanical engineering; Transport Equipment and Technologies, Aircraft Equipment and Technologies Professional orientation 5.5 Transport, Aviation and Shipping Navigation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Targeted at further developing of students' physical activities, skills and hygiene habits through effective methods of physical education, improving their mental and physical performance.

DESCRIPTION OF THE COURSE: The knowledge and skills in Physical Education and Sports develop a wide range of motor skills and habits, help the hardening of the body and contribute to the moral development of students. The enhancement of physical skills is carried out through:

1. General Physical Preparedness (GPP) – in these seminars the students develop a wide range of motor skill and habits; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

2. Sports-Specific Physical Preparedness (SPP) – students improve their sport skills and habits in a specific sport and gain experience through participation in competitions; work to improve strength, speed, endurance, flexibility, structure and skill; increase resistance to unfavourable environmental factors; develop their physical qualities and experience.

PREREQUISITES: The curricula presume the minimum of knowledge and skills acquired at secondary school.

TEACHING METHODS: Seminars in accordance with the curriculum in PE and Sport.

METHOD OF ASSESSMENT: Evaluation is based on functional tests at the end of semester. Lecturer's signature is required at the end of semester.

INSTRUCTION LANGUAGE: Bulgarian

BIBLIOGRAPHY: 1. Владимиров В. Туризъм и ориентиране. Методическо ръководство за студентите от ТУ София, филиал Пловдив. Издателство на ТУ - София. 2010.

DESCRIPTION OF THE COURSE

Name of the course: **Project Management**	Code: **FaBpAE03**	Semester: 6
Type of teaching: Lectures(L) Laboratory work (LW)	Hours per semester: L – 15hours LW – 30 hours	Number of credits: **3**

LECTURER(S):
Assoc. Prof. Toni Mihova, PhD (FME), tel.: 659 XXXX, e-mail: @ tu-plovdiv.bg
Chief Assistant Professor Georgi Georgiev(FME), PhD tel. 659 706, email: georgi@tu-plovdiv.bg
Technical University of Sofia

COURSE STATUS IN THE CURRICULUM: Facultative subject from the curricula for training of students to obtain Bachelor's degree, specialtiy Aviation Engineering and Technologies, Professional orientation 5.5 Transport, Marine and Aviation, Field 5 Technical Sciences.

AIMS AND OBJECTIVES OF THE COURSE: Upon completion students will have basic knowledge of the Project Management processes and will acquire skills for identifying project ideas and turning them into project proposals of different forms.

DESCRIPTION OF THE COURSE: The course is focused on identifying project ideas and turning them into project proposals. Main topics are: Definitions of Project management, Projects and types of projects; The project as an instrument for meeting organizational needs and attracting funding; Methods and techniques for project development; Main elements of the project cycle and the project proposal; Developing project activities and identifying necessary resources; Project budgeting; Project implementation and management; Project teambuilding.

PREREQUISITES:none.

TEACHING METHODS: Lectures with slides and topic discussions; lab work including group case study discussions and an individual assignment with a Powerpoint presentation defense.

METHOD OF ASSESSMENT: Final written exam (60%) and individual assignment defense(40%).

INSTRUCTION LANGUAGE: English

BIBLIOGRAPHY:1. Adrienne Watt, Project Management, Victoria, B.C.: BCcampus., 2014. ISBN 978-1-77420-012-4; 2. A Guide to the Project Management Body of Knowledge (PMBOK Guide), Sixth Edition 2017, ISBN: 978-1-62825-390-0; 3. Stephen Barker and Rob Cole, Brilliant Project Management: What the best project managers know, do, and say; Pearson 2014 , ISBN 9780273775096; 4. Joseph Heagney, Fundamentals of Project Management, Fourth Edition; 2012 American Management Association, ISBN-13: 978-0-8144-1748-5; 5. Lee A. Swanson, Business Plan Development Guide, Saskatoon, Saskatchewan 2017, ISBN 978-0-88880-618-5; 6. Владимир Иванов,. „Ръководство за подготвяне на бизнес план“ на Център по предприемачество към Технически университет – София, филиал Пловдив, 2010.