NATIONAL TECHNICAL UNIVERSITY OF UKRAINE

"IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE"

EDUCATIONAL AND RESEARCH INSTITUTE OF AEROSPACE TECHNOLOGIES

APPROVED
methodical council
KPI im. Igor Sikorsky
(protocol № ***5*** dated ***23.02.2023***)

F- CATALOG

ELECTIVE EDUCATIONAL DISCIPLINES
for bread-winners on the educationally-professional program
first (bachelor) level of higher education

"Aerospace and Rocket Systems Engineering"

Specialty 134 Aviation and space-rocket technique

(Enrolment 2020, 2021)

PPROVED:
Vchenoy Rada
Scientific Research Institute of
Aerospace Technologies
KPI im. Igor Sikorsky
(protocol №. ____ dated _____2023)

KYIV 2023

In accordance with Section X of Article 62 of the Law of Ukraine "On Higher Education" (No. 1556-VII dated 01.07.2014), elective subjects are subjects of free choice of students for a certain level of higher education, aimed at ensuring general and special (professional) competencies for specialty

The volume of optional academic disciplines is at least 25% of the total number of ECTS credits provided for this level of education.

The content of a specific optional educational discipline is determined by its syllabus - the working program of the educational discipline.

Elective academic disciplines provide the applicant with the opportunity to:

- build an individual learning trajectory;
- familiarize yourself with the current level of scientific research in the relevant field of knowledge;
- deepen professional training within the chosen specialty and educational program;
- to obtain additional learning outcomes.

The minimum number of students in the group for studying the selective discipline of the F-catalogue of the first (bachelor) level is 15 people.

The catalog contains an annotated list of disciplines offered to students of the first (bachelor's) level of HE curriculum for the 5th, 6th, 7th and 8th semesters.

The procedure for choosing academic disciplines from the F-Catalog by students of the first (undergraduate) RVO is implemented through the university's specialized information system my.kpi.ua.

- students of the 2nd year - to select disciplines for the third year of training (a student can pay 7 disciplines for a total amount of 28 ECTC credits);
- students of the III year - to select disciplines for the fourth year of training (a student can pay 7 disciplines for a total amount of 28 credits ЄKTS).

The procedure for the selection of primary disciplines from the F-Catalogue by students of the first (bachelor's) RVO is implemented through a special information system of the university my.kpi.ua.

For whom it is necessary to work on the foot:
Register on the website https://my.kpi.ua/
At the menu "Profile" => "Binding data" know your name, enter your date of birth and bind (save) data. You will deny access to the student's office and to the choice of disciplines. Dali necessary to develop technically a choice of disciplines.
In times of impossibility to form the initial group for the formation of the singing discipline of normative numericality, students hope to be able to create a second choice, having come to the already formed initial groups (another wind of vibrancy). The graduate student of VO, who, having violated his right to choose, can make entries for the graduation of primary disciplines, appointed by the head of the graduation department for optimizing primary groups and streams.
It is not allowed to change other disciplines after the beginning of the first semester, in which the stench is laid.

LIST of optional educational components
for the 3rd and 4th courses for 2023-24
Cycle of professional training
level: first (undergraduate)
field of knowledge: 13 Mechanical engineering
specialty 134 Aviation and rocket and space engineering
Educational program: "Engineering of aviation and rocket-space systems"
Graduation Department: Space Engineering ER IAT

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5 semester

Methods and facilities of pipe aerodynamic experiment

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, physics, theoretical mechanics, hydrogas dynamics and thermodynamics.
What will be studied	Methods of implementation of experimental researches of basic aerodynamic descriptions of aircrafts; methods of planning of elements of mechanical experimental equipment are for determination of aerodynamic descriptions of aircrafts.
Why it is interestingly/necessary to study	For the engineer of aviation and space-rocket technique, unlike other engineering specialities, a necessity is knowledge of aerodynamics, in that time as an aerodynamic experiment remains the source of the most reliable aerodynamic descriptions of planning object to beginning of flying tests.
Why it is possible to learn	To get knowledge of physical properties of air environment and basic laws of flowing around of bodies the current of air; structures of models are for aerodynamic tests and requirements to them; types of aerodynamic tests and their features; basic principles of avoidance of undesirable vibrations of constructions of aircrafts and their elements; ability to develop the plan of pipe aerodynamic experiment; to conduct the statistical analysis of results of experiment with bringing of necessary amendments; to determine the basic parameters of stream, aerodynamic descriptions of aircrafts and their parts experimentally, including airscrews;
As possible to use the purchased knowledge and abilities	To use information and of communication technologies and software is specialized at studies and in professional activity; to take into account the economic and administrative aspects of production of elements and objects of aviation and space-rocket technique in professional activity; to organize and use the compatible discussions of methods of decision of non-standard tasks of planning.
Informative providing of discipline	Syllabus (Working programs of discipline), control tasks, train aid.
Type of semester control	Test

Exploitation of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Theory of mechanisms and machines, Details of machines and basis of constructing, Construction of AC.
What will be studied	Theory, methods and practice of exploitation of constructions of objects of aviation and space-rocket technique; methods of diagnostics of current status of constructions, principles of estimation of remaining resource of collapsible constructions.
Why it is interestingly/necessary to study	Knowledge and ability, what students, get during the study of this discipline, allow to plan and organize safe exploitation of objects of aerotechics which is able to maintain the set loading in the set terms.
Why it is possible to learn	In the results of study disciplines turn out knowledge and skills, necessary for organization of process of exploitation of air ships, according to operating norms and management from flying exploitation of objects of aerotechics; basic information turn out about realization of diagnostics of current status of constructions and estimation of remaining resource.
As possible to use the purchased knowledge and abilities	To work on engineering positions in organizations which exploit airplanes and helicopters of a transport category. To organize exploitation of modern AC and KA . to Organize the processes of diagnostics of current status of constructions of objects of aerotechics; to develop repair technical documentation; to develop hardwares for the increase of efficiency of maintenance of objects of aerotechics.
Informative providing of discipline	Syllabus, compendium of lectures, task for practical employments
Type of semester control	Test

Flying tests

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline requires a presence for the students of knowledge and abilities, which will turn out during the study of disciplines Higher mathematics, Physics, Special questions of higher mathematics, Aerodynamics of AC.
What will be studied	Methods of organization and realization of model flying experiment for determination of actual values of aerodynamic descriptions of objects of aviation and space-rocket technique, and also parameters of their firmness and manageability in operating terms, indicated in the norms of flying fitness for the corresponding types of AC; principles of planning of the measuring systems, current parameters of flight intended for determination.
Why it is interestingly/necessary to study	The study of discipline enables to plan the process of certification of object of air-space technique, in particular, to determine measures which allow to take into account the requirements of norms of service ability for the concrete types of aircrafts, by model flying tests. Flying tests are especially important for the objects of misselry, in particular rockets-transmitters, as often is the only method of determination of aerodynamic and dynamic descriptions of AC in the conditions of large hypersound of speed.
Why it is possible to learn	To develop the methods of realization of model flying tests, and determinations of aerodynamic descriptions of AC on the basis of indirect data; to develop the side variants of the measuring systems, and also separate mechanical devices for intention of parameters of current of air, especially in the conditions of ultraspeeds; to develop the algorithms of calculation of aerodynamic and dynamic parameters of AC on results the indirect measuring.
As possible to use the purchased knowledge and abilities	Knowledge and ability, yaks, turn out in the process of research of this discipline, allow to accept direct participation in the process of certification of objects of aerotechics, in particular airplanes and helicopters of a transport category; in addition, they allow to execute the calculation planning of objects of misselry, in particular, rockets-transmitters, in particular, calculation of aerodynamic descriptions and descriptions of firmness and manageability in the conditions of hypersound speeds.
Informative providing of discipline	Syllabus, compendium of lectures, control tasks, train aid
Type of semester control	Test

Methods of calculable mathematics

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, Information technologies and general methods of development of application software.
What will be studied	Numeral methods of decision of equalizations and their systems; tasks of interpolation and approximation; numeral integration and differentiation; statistical methods of analysis of casual processes.
Why it is interestingly/necessary to study	A capture discipline allows to understand mathematical bases of application of the modern application programs, and also consciously to go near the choice of parameters and algorithms for determination of aerodynamic descriptions, loading, decision of tasks of dynamics of flight.
Why it is possible to learn	To apply in professional activity the modern methods of designing, constructing of elements and systems of aviation and space-rocket technique; to develop the application programs for operative implementation of non-standard calculations.
As possible to use the purchased knowledge and abilities	To fold the mathematical models of processes and systems, decide the intricate applied mathematical problems of aerodynamics, durability, reliability, dynamics and management aircrafts.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Special questions of higher mathematics

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, Information technologies and general methods of development of application software.
What will be studied	Statistical analysis of casual processes; numeral methods of decision of scalar equalizations, systems of linear (method of Гауса-жордана, simple iteration, Seidel) and nonlinear equalizations (method of Newton); interpolation (by the polynomials of Lagrange and Newton, by splines); reverse interpolation; least-squares method.
Why it is interestingly/necessary to study	Understanding of mathematical bases allows to apply the modern application programs, and also consciously to go near the choice of parameters and algorithms for determination of aerodynamic descriptions, loading, decision of tasks of dynamics of flight.
Why it is possible to learn	To execute non-standard calculations for designing, constructing of elements and systems of aviation and space-rocket technique.
As possible to use the purchased knowledge and abilities	To decide the intricate applied mathematical problems of aerodynamics, durability, reliability, dynamics and management aircrafts. To fold the mathematical models of processes and systems.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

A calculable design is in an aerospace technique

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, Information technologies and general methods of development of application software.
What will be studied	Numeral methods of decision of the systems of equalizations (simple iterations, Seidel, sprints); decision of the Cauchy problem; elements of mathematical statistics; methods of processing of experimental data; numeral differentiation and integration;
Why it is interestingly/necessary to study	A capture the methods of numeral design helps consciously to elect parameters and algorithms at the decision of tasks of designing, constructing of elements and systems of aviation and space-rocket technique.
Why it is possible to learn	To create mathematical models for the calculations of parameters of objects of aviation and space-rocket technique (mechanical constructions, aerodynamic descriptions, dynamics of flight, management and others like that).
As possible to use the purchased knowledge and abilities	The got knowledge and abilities allow to decide the tasks of dynamics of flight and management at planning of objects of aviation and space-rocket technique; hydraulics, aero- and gas dynamics for description of co-operation of bodies with a gas and hydraulic environment.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

6 semester

Aviation materials and technologies

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	"Higher mathematics", "Physics", "Chemistry"
What will be studied	Determination of construction steels and alloys, which are used at constructions airplanes, rockets and companions. Separate attention is spared to the study of modern composition materials. In addition front-rank technologies of making of details, frame-clamping units will be studied and aggregates. The special attention will be spared to specific technologies inherent exactly to aerospace industry.
Why it is interestingly/necessary to study	Knowledge and ability, what students, will get "Aviation materials and technologies" during the study of discipline, will allow to create a reliable technique and safely to exploit her during the set resource.
Why it is possible to learn	The result of studies is ability of future specialist effectively, economy and correctly to choose adequate methods and methods of making of elements of construction of AC, using proper aviation alloys, permanent and modern composition materials.
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in area of aviation materials science in the process of engineering activity, ability to use optimal methods for making of structural elements and stowage of them in the completed construction, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Aviation materials science and technological processes

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	"Physics", "Chemistry"
What will be studied	Study of construction and features of properties of construction steels and alloys, which are used at constructions airplanes, rockets and companions. The features of construction and technology of making of composition materials will be studied also. Also front-rank technologies of making of details, frame-clamping units will be studied and aggregates.
Why it is interestingly/necessary to study	Knowledge and ability, what students, will get "Aviation material science and technological processes" during the study of discipline, will allow to create a reliable technique and safely to exploit her during the set resource
Why it is possible to learn	The result of studies is ability of future specialist effectively, economy and correctly to choose adequate methods and methods of making of elements of construction of AC, using proper aviation alloys, permanent and modern composition materials are most widespread in air the rocket production.
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in area of aviation material science in the process of engineering activity, ability to use optimal methods for making of structural elements and stowage of them in the completed construction, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Composite materials and their calculation are on durability

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Physics, Chemistry
What will be studied	Structure and constituents of modern polymeric composition material. Technologies and equipments are for their production. Methods of calculation of unidirectional and stratified composition materials. Terms of the use of certain compositions and possibility of creation of hybrid constructions. Features of constructing and planning of wares are from composite materials in productive terms.
Why it is interestingly/necessary to study	The modern constructions of aerospace technique contain considerable part of wares from composition materials and their amount will grow and farther. Principle of functioning of composite materials fundamentally differs from work of metallic constructions. Creation of modern, front-rank constructions is not possible without knowledge of features, that inherent to such materials and terms of their use. The purchased knowledge extend border of knowledge in industry of modern construction materials in productive terms.
Why it is possible to learn	To capture the methods of calculations of unidirectional and stratified composition materials. To learn a structure and constituents of compos, copulas of structure and eventual descriptions of good. To familiarize with technologies of making of fibres, relating and materials on their basis. To learn to get wares under a concrete task.
As possible to use the purchased knowledge and abilities	The purchased knowledge will allow to take advantage of them at planning and constructing of glider of aircraft and other difficult technical objects. It will be useful at implementation of master's degree work and in further engineering practice. Will increase potential of transmitter of knowledge at the market of labour.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

The computer engineering is in creation of AC

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Graphic geometry, engineering and computer graphics
What will be studied	The computer engineering is in creation of elements of AC
Why it is interestingly/necessary to study	For a future specialist after speciality the Aviation and space-rocket technique it will be useful to learn at planning of elements of AC to use the computer engineering.
Why it is possible to learn	- to know basic principles of work of the system for the computer engineering; - to know setting of different environments of the program; - to know basic and auxiliary program elements for creation of details of AC; able to use the systems of the computer engineering about to development of elements of AC.
As possible to use the purchased knowledge and abilities	- ability to execute planning of elements of AC with the use of possibilities of the computer engineering ability to create a designer to documentation on the elements of AC;
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures, task for implementation of computer practical works
Type of semester control	Test

System CAAD

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Engineering and computer graphics, Information technologies and general methods of application software development.
What will be studied	- to know the structure of the system CAD/CAE/CAM Catia; - to know environments to the module of CAD and their possibilities; - to know base and specific commands to the module of CAD; - able to execute certain sketches; able to create the models of details of AC.
Why it is interestingly/necessary to study	- ability to create the models of details in the system the CATIA modules of CAD ability to use the system САПР for the decision of engineering tasks;
Why it is possible to learn	- to know basic principles of work of the system for the computer engineering; - to know setting of different environments of the program; - to know basic and auxiliary program elements for creation of details of AC; able to use the systems of the computer engineering about to development of elements of AC.
As possible to use the purchased knowledge and abilities	- ability to execute planning of elements of AC with the use of possibilities of the computer engineering ability to create a designer to documentation on the elements of AC;
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures, task for implementation of computer practical works
Type of semester control	Test

Construction of motive options and ramjets of space vehicles

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline requires students to have basic knowledge of Physics, Higher Mathematics, Theoretical Mechanics, Information Technology and general methods of application software development.
What will be studied	Basic constructions and principles of work of motive options and ramjets of space vehicles. Methods of planning and production of components of motive options and ramjets.
Why it is interestingly/necessary to study	Material is laid out from experience and practice of constructing of ramjets of modern enterprises. Except base knowledge of construction and principles of work of ramjet, introduction of additive technologies is presented in the processes of constructing and production.
Why it is possible to learn	To apply basic principles of design and calculations at planning of separate elements of motive options and ramjets.
As possible to use the purchased knowledge and abilities	On a course general skill turn out for constructing and planning of motive options and ramjets. Except it, concentrated on planning of concrete element of construction of engines at choice, which in the future can be a solid argument at arranging on work and presentations you as a specialist.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures, task for implementation of computer practical works
Type of semester control	Test

Planning of aviation and space-rocket technique

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Information technologies and general methods of application software development. Theoretical mechanics. Physics.
What will be studied	Constructing and planning of modern aviation and space technique; study of structure and principles of planning of AC and KA; realization of project researches in the questions of creation of new standards of technique and constructions of aircrafts; mastering of basic skills of the use designing and calculation by the programs in the conditions of much user systems.
Why it is interestingly/necessary to study	The study of discipline enables to get basic information in relation to organizations of modern production processes, in particular to the process of planning of sky truck.
Why it is possible to learn	Knowledge of general principles of construction of constructions of different classes of aircrafts; methods of constructing of aviation and rocket AC, KA; methods of creation of self-reactance models of planning objects by means of programming language, principles of realization of calculation and analytical algorithms as application software; methods of creation of self-reactance models of AC by means of analytical algorithms as application software.
As possible to use the purchased knowledge and abilities	To analyses requirement specifications, execute the search of prototypes and elect the most optimal methods of decision of project task; to design and analyses the structural charts of flying and space vehicles, using normatively-technical documentation, certificate literature; to determine the terms of existence of AC and KA; to conduct the calculations of basic elements of AC and KA and them structurally-power charts.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Organizational bases and principles of designing of aviation and space-rocket technique

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Information technologies and general methods of application software development. Theoretical mechanics. Physics.
What will be studied	Constructing and planning of modern aviation and space technique; study of structure and principles of planning of AC and KA; realization of project researches is in the questions of creation of new standards of technique and constructions of aircrafts; mastering of basic skills of the use designing and calculation by the programs in the conditions of much user systems.
Why it is interestingly/necessary to study	The study of discipline enables to get basic information in relation to the structure of modern industrial establishments, related to the process of planning and production of modern aviation and rocket technique.
Why it is possible to learn	Knowledge of general principles of construction of constructions of different classes of aircrafts; methods of constructing of aviation and rocket AC, KA; methods of creation of self-reactance models of planning objects by means of programming language, principles of realization of calculation and analytical algorithms as application software; methods of creation of self-reactance models of AC and KA by means of analytical algorithms as application software.
As possible to use the purchased knowledge and abilities	To analyses requirement specifications, execute the search of prototypes and elect the most optimal methods of decision of project task; to design and analyses the structural charts of AC and KA, using normatively-technical documentation, certificate literature; to determine the terms of existence of AC and KA; to conduct the calculations of basic elements of AC and KA and him structurally-power chart.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Process control of appeal of technical documentation

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Information technologies and general methods of application software development. Theoretical mechanics. Physics.
What will be studied	Realization of project researches of creation of new standards of technique and constructions of aircrafts. Mastering of basic skills of using the designing and calculation methods of planning, Organization of bases data, structure of appeal of information, Concept of workplace of engineer.
Why it is interestingly/necessary to study	The study of discipline enables to get basic information in relation to organizations of modern production processes, in particular to the process of planning of sky truck.
Why it is possible to learn	To understanding of cross-coupling of the systems of AC inter se and on an airplane on the whole. To skills of calculation of the separate systems of AC and choice them optimal parameters. methods of creation of self-reactance models of planning objects by means of programming language, principles of realization of calculation and analytical algorithms as application software; methods of creation of self-reactance models of AC by means of analytical algorithms as application software.
As possible to use the purchased knowledge and abilities	To analyses requirement specifications, execute the search of prototypes and elect the most optimal methods of decision of project task; to design and analyses the structural charts of AC, using normatively-technical documentation, certificate literature; to determine the terms of existence of AC; to conduct the calculations of basic elements of AC and him structurally-power chart.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Physical properties of metals and composition materials

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Knowledge of higher mathematics, physics and chemistry
What will be studied	Physical and chemical properties of basic metallic alloys, which are used for the production of aircrafts. Methods of their production. Physical and chemical properties of basic types of composite materials, which are used for the production of aircrafts. Methods of their production.
Why it is interestingly/necessary to study	Discipline allows to provide the best understanding of influence of external environments on basic mechanical and chemical properties of construction materials, which are used for the production of aircrafts, and also change of their properties, under act of alternating loads.
Why it is possible to learn	Base knowledge of structure and properties of construction materials, knowledge of basic physical and chemical processes, which flow in construction materials, and also methods of increase of their tireless durability.
As possible to use the purchased knowledge and abilities	Will be purchased following a competence: Ability to provide upgrading of production of details of mechanical constructions by their optimization in the process of planning. Ability to develop the optimal methods of making of details of mechanical constructions of aircrafts.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Computer-integrated computer technologies of planning of aviation and space-rocket technique

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Mastering the disciplines "Engineering and computer graphics", "Information technologies and general methods of application software development"
What will be studied	Basic principles and typical programmatic facilities of construction of certainly-element models of aviation constructions. Determination of resource of constructions. Receptions of construction and establishments in the computer models of aircrafts of typical elements: theoretical surfaces, areas of pin co-operation, 3Д bodies. Principles of work are with materials, stuff elements of constructions.
Why it is interestingly/necessary to study	The basic instrument of the automated planning is CAD/CAE-systems. Modern CAD/CAE-systems allow fully to design the structure of aircraft of any complication, and effectively to optimize properties of her elements.
Why it is possible to learn	Knowledge of facilities of modern automated calculation designing and ability by them to use.
As possible to use the purchased knowledge and abilities	Will be purchased such to the competence: - Ability to apply knowledge in practical situations, when is not possible to model such situation in the real terms in good time. - Ability of designing of hardwires or systems is taking into account the scenario of development of emergency situation.
Informative providing of discipline	On-line and working tutorials of discipline. Textbook, Syllabus, list of computer practical works
Type of semester control	Test

A design of emergency situations is in the environment of ANSYS

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Mastering the discipline Information technologies and general methods of application software developm
What will be studied	Determination of the technical state, in which an object of diagnosticating, search or localization of place of damages or determination of reason of transition of object, is in the non-working state, prognostication of change of the technical state of object with determination of reason of probability of such change or with determination of time domain, which processes which will stipulate the undesirable changes of the technical state can begin after.
Why it is interestingly/necessary to study	The basic instrument of the automated planning is CAE of -systems. Modern CAE of -systems allow fully to design the structure of aircraft of any complication, and also, phenomena of destruction of construction in emergency situations.
Why it is possible to learn	Able to inculcate modern technologies which are used in the space engineering, make alteration and suggestions in designer and technological documentation taking into account the results of design of possible emergency situations. Able to link the purchased knowledge and abilities within the framework of approach of the systems to the complex providing of high scientific and technical level of development of the systems of the space engineering
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in the process of engineering activity, ability to use optimal methods for determination of current status of difficult technical objects, to estimate a remaining resource, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	On-line and working tutorials of discipline, PCO. Textbook, Syllabus, list of computer practical works
Type of semester control	Test

Construction and planning of engines and power plants

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Theoretical mechanics, Machine details and the basics of aircraft design, Theory of mechanisms and machines, Aerospace materials science.
What will be studied	The basic types of construction of engines are examined, description of principles of work of turbojet is pointed, turbofan and propeller turbines. Principle of receipt of traction is examined in turbojet and turbofan engines. Principle of receipt of traction of propeller (turbofan) turbines. Description of changes of the state of gas of ГТД is by means of diagram of duty cycle. Reason of limitation of accessible traction of engine is depending on the temperature of gas to the turbine. The basic structural elements of different types of ТРД are pointed. Explanation of terms «hauling ККД» and «thermal ККД». Description of influence of complete level of increase of pressure is on thermal ККД. Explanation of changes of hauling ККД for turbojet, turbofan and propeller turbines. Explanation of term «specific expense of fuel» is for turbojet and turboprop engines. Lists over of advantages and defects turbojet will be brought, turbofan and propeller turbines. Base processes and transformations of static pressure, temperature and axial speed are examined inwardly ГТД in cruiser flight. Resulted differences between absolute, circuitous and axial speed. Creation of details is in the environment of Autodesk Inventor.
Why it is interestingly/necessary to study	Any aircraft is built round an engine, that is why it is necessary well to understand structural features and principle of work. Theoretical part is in a course connected with practical.
Why it is possible to learn	In the process of studies students will be able to connect the theoretical knowledge purchased before from aerodynamics and thermodynamics with the practical use them at creation of structural elements of engines of AC.
As possible to use the purchased knowledge and abilities	The purchased knowledge students will be able to use for the selection of optimal models of engines of aircrafts, and also will learn to expect, and create details for the different types of engines.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Turbo-engines of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Hydro-gas dynamics and thermodynamics, theoretical mechanics, details of machines and the basics of aircraft design, theory of mechanisms and machines, aerospace materials science.
What will be studied	History of creation of turbo-engine. Principle of work, and duty cycle of ГТД, dependences of volume on pressure in the working loop. Application of gas laws is in ГТД. Construction of gas-air flow duct (to the channel). Types of airscoops, compressors, combustion, turbines, and system of exhaust chambers. Methods of the module constructing. Types of materials that used. Creation of details is in the environment of Autodesk Inventor.
Why it is interestingly/necessary to study	A far over of graphic and digital materials which will help to understand as ГТД work will be brought. Theoretical part is in a course connected with practical.
Why it is possible to learn	Students will learn to distinguish the different types of ГТД in accordance with their structural features. Able to connect the theoretical knowledge purchased before from aerodynamics and thermodynamics with the practical use them at creation of elements of ГТД.
As possible to use the purchased knowledge and abilities	The purchased knowledge students will be able to use for the selection of optimal models of engines of aircrafts depending on their practical application. Will master, technology of making and selection of materials, which will help in the design of elements of ГТД.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Bases of planning of ramjets

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	3 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Hydro-gas dynamics and thermodynamics, theoretical mechanics, details of machines and the basics of aircraft design, theory of mechanisms and machines, aerospace materials science.
What will be studied	Principle of work, and duty cycle of ГТД, is base, dependences of volume on pressure in the working loop. Application of gas laws is in ГТД. Construction of gas-air flow duct (to the channel). Types of airscoops, compressors, combustion, turbines, and system of exhaust chambers. Methods of the module constructing. Types of materials that used. Creation of details is in the environment of Autodesk Inventor.
Why it is interestingly/necessary to study	An educational process will be based on the review of typical charts of ГТД, and their details, on the basis of what students will be able to expect and optimize, or create structural elements.
Why it is possible to learn	Students will learn to distinguish the different types of ГТД in accordance with their structural features and application domain. Able to connect the theoretical knowledge purchased before from aerodynamics and thermodynamics with the practical use them at creation of elements of ГТД.
As possible to use the purchased knowledge and abilities	The purchased knowledge to the students will give an idea about that as ramjets work, and also will deepen знання from thermodynamics, aerodynamics, 3 - design D. Students will be able to learn to design elements and parts of engines of aircrafts.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

7 semester

Aerospace calculable engineering

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of the discipline is based on the knowledge and skills acquired during the mastering of such courses as "Physics", "Higher Mathematics", "Aircraft Aerodynamics", "Information Technologies and General Methods of Application Software Development", "Theory of Machines and Mechanisms"
What will be studied	Review of basic equalizations of dynamics of liquid, applied to the external streams, plugging classic and front-rank approaches in the design of turbulence for aviation and space applications; methods of CFD for low- and high-speed streams which are used for front-rank aerospace applications; modern to case studies researches and examples of application.
Why it is interestingly/necessary to study	This course has for an object to improve your skills by the detailed acquaintance with the most modern calculable methods and their application for additions of aerospace technique of digital age. It gives unique possibility for interdisciplinary education and transmission of knowledge in the computing engineering of mechanics of liquid and solid for application in aerospace industry.
Why it is possible to learn	On successful completion of course a student must be able: 1. To influence main equalizations of hydrodynamics for the design of external streams; 2. To collect data and analyses the results of calculations by means of numeral methods and models for turbulent streams which are used in aviation and space applications; 3. To estimate force and limitation of calculable methods which are used in aerospace industry; 4. To offer solution in combination with present efforts of industry and scientific circles for perfection of the most modern methods in the programs marked higher.
As possible to use the purchased knowledge and abilities	Due to combination of material which is based on before got skills and special object, this course has for an object to give to the students general practical skills and front-rank knowledge which can be adapted to the wide spectrum of applications in industry of the aerospace computing engineering.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Calculable hydrodynamics is in aerospace industry

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	"Physics", "Higher Mathematics", "Aircraft Aerodynamics", "Theory of Machines and Mechanisms"
What will be studied	Calculable hydrodynamics (CHD) is numeral research of permanent and non-stationary motion of liquid. Thus, will be studied as CHD is used during all process of planning, from conceptual to gone into detail, for informing of initial conceptions there is perfection of front-rank conceptions. Will be demonstrated, as CHD is used for diminishing to the volume of the physical testing which must be done for verification of design and measuring of his productivity. Will be estimated, as CHD is used for prognostication of descriptions in the systems and subsystems of airplane.
Why it is interestingly/necessary to study	Intensive calculations for a design and optimization became important activity at design and exploitations of the difficult systems in engineering. At that time as calculable science is discipline in itself, she serves for development of all scitech. Without regard to the already considerable level of development, expected, that in next decades will be perceptible swift increase of demand on an exact and reliable numeral design and optimization of the difficult systems, in particular in aerospace industry.
Why it is possible to learn	On successful completion of this course a student must: to understand all aspects of CHD, able to determine fundamental equalizations of mechanics of liquid, able to apply numeral methods, in particular method of eventual volumes, able to determine algorithms decisions, related to CHD, to understand a choice and application of models of turbulence.
As possible to use the purchased knowledge and abilities	Due to combination of material which is based on before got skills and special object, this course has for an object to give to the student’s general practical skills and front-rank knowledge which can be adapted to the wide spectrum of applications in industry of the aerospace computing engineering.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

A computer design is in aerodynamics

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	This course provides basic material that will later become the basis for the study of more complex topics within other disciplines. To successfully master the discipline, students are recommended to have knowledge and skills acquired during the study of higher mathematics, physics, engineering and computer graphics, hydrogas dynamics and thermodynamics, information technologies and general methods of developing application software.
What will be studied	The use of calculable design will be investigated for aerodynamics, concentrated on application in aerospace industry and turbo-machines. Also will be investigated, what role is played by calculable hydrodynamics (CFD) in the process of planning of aircrafts and in current industrial practice.
Why it is interestingly/necessary to study	A computer design in aerodynamics, which complements more expensive empiric approaches, has a decision value for development of aerospace facilities. During the last three decades of possibility of calculable aerodynamics notedly became better after progress in development of computer equipment and algorithms.
Why it is possible to learn	On successful completion of this course a student must be able: 1. To analyse and estimate, as modern instruments of computer analysis are used. 2. To build a calculable net, using the methods of generation of nets. 3. To create the models of analysis on the base of method of eventual elements, using external CAD of -systems. 4. To use the models of analysis for different aerodynamic applications.
As possible to use the purchased knowledge and abilities	The purpose of discipline is grant of knowledge and abilities to the future master's degrees and doctoral students in relation to planning of their further work and study of objects, what of them will study during a city council and postgraduate studies, accordingly.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Non-destructive control and diagnostics of elements of AC

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline is based on such disciplines as "Higher Mathematics", "Physics", as well as Information Technologies and general methods of application software development.
What will be studied	Determination of the technical state, in which an object of diagnosticating, search or localization of site of damage or determination of reason of transition of object, is in the non-working state, prognostication of change of the technical state of object with determination of reason of probability of such change or with determination of time domain, which processes which will stipulate the undesirable changes of the technical state can begin after.
Why it is interestingly/necessary to study	Knowledge and ability, what students, get during the study of discipline "Non-destructive control and diagnostics of elements of AC", allow safely aviation and space technique which is able to maintain the set loading in the set terms.
Why it is possible to learn	The result of studies is ability of future specialist correctly to choose adequate methods and methods diagnosticating of elements of AC, realization of fault detection corresponding methods, complex evaluation of current status and on the basis of the got information to make decision in relation to possibility of further exploitation or necessity of realization of workovers.
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in the process of engineering activity, ability to use optimal methods for determination of current status of difficult technical objects, to estimate a remaining resource, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Non-destructive control and technical measuring of elements of constructions and systems

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline is based on such disciplines as "Higher Mathematics", "Physics", as well as Information Technologies and general methods of application software development.
What will be studied	Non-destructive control and diagnostics of the technical state of elements of construction of difficult aerotechics, search of site of damage and determination of reasons of transition of object in the non-working state, prognostication of remaining resource on the basis of the got information, study of structure of the modern diagnostic systems.
Why it is interestingly/necessary to study	Designing and exploitation of difficult aviation and rocket technique require thorough theoretical knowledge and professional skills. Thus study of discipline "Non-destructive control and technical measuring of constructions and systems", allow correctly to organize a production, technical service and safe exploitation of difficult technique which is exploited in aerospace industry .
Why it is possible to learn	In the process of studies of are acquired skill correctly to go near the choice of the proper methods ways diagnosticating of elements of modern technique of aerospace industry, realization of non-destructive control, evaluation of the technical state and on the basis of the got information to accept a skilled decision in relation to further exploitation on the basis of accordance to the requirements of normative to the documents.
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in the process of engineering activity, ability to use optimal methods for determination of current status of difficult technical objects, to estimate a remaining resource, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Diagnostics of elements of the space-rocket systems

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline is based on such disciplines as "Higher Mathematics", "Physics", as well as Information Technologies and general methods of application software development.
What will be studied	Diagnostics of current technical status of element of construction and his structure, search or localization of site of damage or determination of reason of transition of object in the non-working state, prognostication of remaining resource on the basis of the got information, study of methods of non-destructive control, structure of the modern diagnostic systems.
Why it is interestingly/necessary to study	Knowledge and ability, what students, get during a study disciplines "Diagnostics of elements of the space-rocket systems", allow correctly to organize a production and technical maintenance of the difficult technical systems.
Why it is possible to learn	In the process of studies of are acquired skill correctly to go near the choice of the proper methods ways diagnosticating of elements of AC, realization of non-destructive control, complex evaluation of current status and on the basis of the got information to accept a skilled decision in relation to accordance to the requirements of normative to the documents.
As possible to use the purchased knowledge and abilities	The result of study is a capacity for realization of researches in the process of engineering activity, ability to use optimal methods for determination of current status of difficult technical objects, to estimate a remaining resource, capacity for further autonomous and independent studies on the basis of the newest scientific and technical achievements.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Reliability of aerospace equipment

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, physics, theoretical mechanics, aerospace materials science
What will be studied	Theoretical and methodical questions of setting of norms of reliability of the difficult technical systems, organizational and technical aspects of untiing of problem of providing of quality and reliability of aviation and space technique on the different stages of life cycle of wares
Why it is interestingly/necessary to study	At creation and exploitation of AC large attention is spared to their reliability, but avoiding refuses not always is succeeded, that results in the considerable losses of facilities, forces, time. It contacts with complication of technique, increase of complication of designer and technological tasks, special external environments. Therefore the problem of creation of reliable wares of aviation and space technique becomes more actual.
Why it is possible to learn	A nomenclature and requirements are modern to the reliability indexes, methods of calculation, setting of norms, monitoring and providing of reliability of aerospace technique. Application of method of analysis of kinds, causes and effects of potential disparities good on the different stages of life cycle
As possible to use the purchased knowledge and abilities	Ability to carry out a ground and determination of reliability of elements of aviation and space-rocket technique indexes, ability to design and produce the test of her elements, equipment, systems, subsystems, develop and realize the programs of providing of reliability and competitiveness of aerospace technique
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Safety of flights of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, physics, theoretical mechanics, aerospace materials science
What will be studied	Actuality of problem of safety of flights of AC, modern concept vehicle. Methods of estimation and providing of safety of flights of AC. Features of estimation of influence of refuses of AC (systems, basic asms), errors of personnel, unfavorable external terms are on safety of flights and measures in relation to her providing and increase. Bases of prophylactic work are in relation to warning of flying events and pre-conditions to them
Why it is interestingly/necessary to study	The got knowledge and skills will be useful at implementation and defence of qualifying works and in professional activity, related to planning, making, certification, exploitation of AC. It is in addition, useful it will be to capture the modern methods of engineering analysis of kinds, reasons, consequences, criticism of disparities refuses of objects of aerospace technique
Why it is possible to learn	To recognize unfavorable factors, estimate their meaningfulness from the point of view of influence on the flying fitness of AC. To work off and realize practical measures in relation to providing of flying fitness and increase of safety of flights of AC
As possible to use the purchased knowledge and abilities	Ability to carry out collection and treatment of initial information, determination and analysis of reliability and safety of flights of AC. indexes. Ability to design and realize measures on maintenance of flying fitness of AC, their equipment, basic systems and components
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Operating reliability of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	Higher mathematics, Mechanics of materials and structures, Aerospace materials science, Machine details and fundamentals of aircraft design.
What will be studied	Theoretical and methodical questions of operating reliability of AC. Normative, practical, technical aspects of organization and realization of service, diagnostics, analysis and providing of reliability of especially responsible elements of constructions. Features of realization of analysis of kinds, reasons, consequences, criticism of disparities refuses of different objects of aerospace technique
Why it is interestingly/necessary to study	Bread-winners will get knowledge and abilities, which allow professionally to organize and realize safe exploitation of AC, proof implementation them objective functions in the set terms of application. Necessity of search of ways of increase of efficiency of the use of AC and them basic components stipulates the permanent search of possibilities of modernization of strategy of their exploitation
Why it is possible to learn	Bread-winners will get knowledge and skills, necessary for organization of process of exploitation of AC, according to the rules of flying and technical exploitation, realization of diagnostics of current status of constructions, timely recognition of refuses and disrepairs, estimations of resource possibilities, flying fitness, documenting the got results
As possible to use the purchased knowledge and abilities	To organize exploitation of aircrafts, conduct operating tests and diagnostics of the technical state of constructions of her components. To develop operating, repair, technological documentation of standards of AC, methods and hardwares of their service taking into account the rules of providing of reliability of the difficult technical systems
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Systems and occasions of РКА

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The discipline "RKA systems and drives" is based on knowledge of the following disciplines: Higher mathematics, Physics, Theoretical mechanics, Electrical engineering and electronics, Theory of automatic control
What will be studied	Theoretical bases of construction, methods of analysis of static and dynamic descriptions, methods of calculation of occasions of control system by aircrafts
Why it is interestingly/necessary to study	Planning of executive devices of control system of aircrafts is synthetic discipline which is on the joint of various industries of natural and technical sciences.
Why it is possible to learn	As a result of studies a student gets knowledge in relation to bases of theory, principles of construction and functioning, feature of structurally-scheme realization of occasions of AC. On results laboratory practical work a student gets skills of research of static and dynamic descriptions of occasions of control system, and also mathematical description of models of occasions of AC.
As possible to use the purchased knowledge and abilities	The purchased knowledge and competenses can be used for development and introduction of both executive elements of control system and mechatronics knots and devices for the different areas of scitech.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Executive devices of control system of AC

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The discipline "Executive devices of aircraft control systems" is based on knowledge of the following disciplines: Higher mathematics, Physics, Theoretical mechanics, Electrical engineering and electronics, Theory of automatic control
What will be studied	Theoretical bases of construction, structural variants of realization and methods of analysis of descriptions, executive devices of control system by aircrafts
Why it is interestingly/necessary to study	Planning of executive devices of control system of aircrafts is synthetic discipline which is on the joint of various industries of natural and technical sciences.
Why it is possible to learn	As a result of studies a student gets knowledge in relation to bases of theory, principles of functioning, features of structurally-scheme and structural realization of occasions of control system of AC. On results laboratory practical work a student gets skills of research of static and dynamic descriptions of occasions of control system, and also mathematical description of models of occasions of AC.
As possible to use the purchased knowledge and abilities	The purchased knowledge and competenses can be used for development and introduction of both executive elements of control system and mechatronics knots and devices for the different areas of scitech.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Bases of construction of mechatronics were built on by AC

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, autumn semester
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 72 hours audience work, 48 hours independent work
Teaching language	English
Requirements are to beginning of study of discipline	The discipline "Fundamentals of construction of mechatronic devices LA" is based on the knowledge of the following disciplines: Higher mathematics, Physics, Theoretical mechanics, Electrical engineering and electronics, Theory of automatic control.
What will be studied	Theoretical bases of construction, structural variants of realization, methods of analysis of descriptions and basis of programming of mechatronics of devices of control system by aircrafts
Why it is interestingly/necessary to study	Planning of mechatronics of devices is synthetic discipline which is on the joint of various industries of natural and technical sciences.
Why it is possible to learn	As a result of studies a student gets knowledge in relation to bases of theory, principles of functioning, features of structurally-scheme and structural realization of mechatronics built on AC. On results laboratory practical work a student gets skills of research of static and dynamic descriptions of occasions of control system, mathematical description of their models and skill of programming of inspectors of mechatronics.
As possible to use the purchased knowledge and abilities	The purchased knowledge and competenses can be used for development and introduction of robotics and mechatronics knots and devices for the different areas of scitech.
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

8 semester

Construction of engines of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	Mechanics of Materials and Structures, Aerospace Materials Science, Theory of Mechanisms and Machines, Details of Machines and Fundamentals of Aircraft Design, Theoretical Mechanics, Hydrogas Dynamics and Thermodynamics
What will be studied	Theoretical and methodical questions of construction of engines of AC, practical and technical aspects of measuring and analysis of them functional parameters. Setting of norms and providing of durability of basic details and frame-clamping units of engines
Why it is interestingly/necessary to study	Development and accompaniment of exploitation of AC require understanding and account of economic feasibilities, principles of functioning and construction of different types, design-layout charts of engines, and also ways of improvement of project parameters with the purpose of providing of the set flight engineering descriptions
Why it is possible to learn	Receipt of knowledge of features of forming of construction of components of engines of AC, practical skills of ground of choice of project parameters and corresponding calculation-analytical researches a future specialist
As possible to use the purchased knowledge and abilities	Ability to determine and elect an optimal type and parameters of engines of AC. Ability to decide tasks and problems, related to development, making, certification of constructions of engines of AC, their components
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Checking of the technical state of engines of aircrafts systems

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	Mechanics of Materials and Structures, Aerospace Materials Science, Theory of Mechanisms and Machines, Details of Machines and Fundamentals of Aircraft Design, Theoretical Mechanics, Hydrogas Dynamics and Thermodynamics
What will be studied	Strategies of exploitation of AC and their components, question of control of the technical state of engines, methods of control of qualificatory parameters and descriptions. Methodical aspects of objective control, instrumental methods of non-destructive control, principles of work and construction of devices of control of engines of AC.
Why it is interestingly/necessary to study	Engines must proof work in the wide range of office and terms of flight of AC. hours. For the receipt of objective information about the technical state of AC and engine necessary knowledge about a level and dynamics of change of certain parameters in times of flight (test). The choice of such parameters is stipulated by the volume of the controlled information, methods of measuring, transformation and treatment of their sizes. From adequacy of determination and account of parameters and descriptions of engines efficiency and safety of flights of AC depend at all stages of life cycle
Why it is possible to learn	A receipt of knowledge a bread-winner is about possibilities, composition and development of the checking of the technical state of engines systems, facilities of measuring, digital facilities of transformation, transferrableness and treatment of objective self-reactance information, methods of early exposure of change of the technical state, recognition of change of the vibrostate, methods of determination of reasons of refuses and disrepairs of components of engines
As possible to use the purchased knowledge and abilities	Ability to determine and elect an optimal type and self-reactance outline of engines of AC. Ability to decide tasks, related to development, making, certification, accompaniment of exploitation of power-plants of AC, their components
Informative providing of discipline	Syllabus (executable educational code of discipline), train aid
Type of semester control	Test

Designingof the systems of power-plants of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	Mechanics of Materials and Structures, Aerospace Materials Science, Theory of Mechanisms and Machines, Details of Machines and Fundamentals of Aircraft Design, Theoretical Mechanics, Hydrogas Dynamics and Thermodynamics
What will be studied	Modern problems of creation of the systems of power-plants (СУ) of AC, methods of their planning. Constructing and calculation of the systems of fastening of engines and their depreciation, fuel and oily systems. Internal aerodynamics of СУ, subsonic and supersonic airscoops, and also initial devices of СУ. Prospects of development of engines of various AC
Why it is interestingly/necessary to study	Development of AC requires understanding and account of economic feasibilities, principles of functioning and construction of different design-layout charts of engines and other responsible component СУ. In this context the possible ways of improvement of project parameters of the systems СУ are examined with the purpose of providing of the set flight engineeringdescriptions of AC
Why it is possible to learn	Mastering of discipline gives understanding of features of forming of construction of the modern and perspective systems СУ AC. Practical skills of calculation-analytical researches and choice of the systems of fastening of engines and their depreciation, fuel and oily systems of AC
As possible to use the purchased knowledge and abilities	Ability to determine and reasonably elect an optimal type and parameters of the systems СУ AC. Ability to decide tasks, related to development, making, verifications of accordance of the functional systems of engines of AC, their components. Further development of scientific directions and critical technologies which provide creation of perspective and competitive types of engines and other component systems СУ AC
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Mechanical systems of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	Knowledge and skills acquired during the study of Higher Mathematics, Physics, Theoretical Mechanics, Engineering and Computer Graphics, Theory of Mechanisms and Machines, Mechanics of Materials and Structures, Machine Details and Fundamentals of Aircraft Design are required
What will be studied	Question of planning and construction of the functional systems of AC. Review of possible types of the mechanical systems which answer the set technical requirements, reasonable expedient application of the systems domains, methodical vehicle of evaluation of their perfection. Principles of work of asms, descriptions of variants of structural implementation, basic parameters and descriptions, are examined
Why it is interestingly/necessary to study	At planning and research of constructions of AC always pressing questions them power, kinematics and dynamic analysis and research. The got knowledge and skills will be useful at implementation and defence of qualifying works and in professional activity, related to planning and accompaniment of all stages of life cycle of asms and constructions of AC
Why it is possible to learn	It is possible to learn to conduct an analysis and synthesis of the mechanical systems of AC. Mastering of discipline develops skills of ground of construction of AC, implementation of analysis and calculation of the mechanical systems, evaluation of the internal and external power fields of typical constructions. To accept the self-weighted decisions, related to designer accompaniment of all stages of life cycle of elements of the mechanical systems of AC
As possible to use the purchased knowledge and abilities	Ability to develop a general construction, carry out the calculations of elements of the mechanical systems of AC. Ability to design, to organize and test elements of the mechanical systems of aerospace technique
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Systems of life-support of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	The design of life support systems is a specific task that requires a complex engineering approach and knowledge of Physics, Chemistry, Hydrogas Dynamics and Thermodynamics, Occupational Safety and Civil Protection
What will be studied	Comfort of side vital environment. Tasks, composition, classification, requirements, are to side СЖЗ of crew of AC. Facilities and СЖЗ are on the basis of supplies of matters. Bases of regeneration of matters are in СЖЗ. Planning of airborne equipment, asms, complexes of СЖЗ of crew of AC
Why it is interestingly/necessary to study	At creation and exploitation of AC large attention is spared to their reliability, unconcern and comfort of application. It contacts with complication of the side systems of AC, increase of volumes and complication of having a special purpose tasks, variety and of long duration action of terms of flight as on a technique so on a crew. Therefore the problem of creation of comfort terms of work of crew of modern AC does not lose actuality
Why it is possible to learn	Mastering of discipline gives understanding of bases of vital functions of man, medical and biologicalnorms and weekend of data for planning of СЖЗ of crew; specifics of external and requirements environments are to the side equipment of pilot-controlled AC, classification of methods of life-support; principles of action, technical descriptions, going near planning and calculation of СЖЗ of different of type - on the basis of supplies of matters, with the partial regeneration of matters and closed regeneration systems
As possible to use the purchased knowledge and abilities	Knowledge and skills, got as a result of study of discipline, will be useful to the wide circle of specialists which will work (work) in area of creation of modern technologies and side systems of the different setting for the pilot-controlled aerospace technique
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Systems of equipment of aircrafts

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	The design of life support systems (LSS) is a specific task that requires a complex engineering approach and knowledge of Physics, Chemistry, Hydrogas Dynamics and Thermodynamics, Occupational Safety and Civil Protection.
What will be studied	Theoretical bases and principles of construction, indexes of quality, flow diagrams, methods of analysis of static and dynamic descriptions, methods of calculation of asms of the systems of mechanical equipment of AC. Examples and features of construction and backuping of elements of the systems of equipment of AC.
Why it is interestingly/necessary to study	Planning of the systems of mechanical equipment of AC is the sphere of scientific and technical activity, which requires knowledge and abilities of various industries of natural and technical sciences. A capture theoretical and practical content of discipline will allow to create the reliable aviation and space-rocket systems
Why it is possible to learn	Studies knowledge of bases of theory, principles of construction and functioning, feature of structurally-scheme realization of the systems of mechanical equipment of AC. ensue. Skills of research of parameters and key descriptions of the systems of mechanical equipment of AC, formalized description of their models, procedures of making decision, related to designer accompaniment of all stages of life cycle of the systems of mechanical equipment of AC turn out on results practical employments
As possible to use the purchased knowledge and abilities	The purchased knowledge and abilities it is possible to take advantage of at development, making, tests, certification, exploitation, proceeding in the capacity of the systems of mechanical equipment of AC.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Facilities of static tests of durability of construction of AC

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	Physics, Chemistry, Theory of mechanisms and machines, Mechanics of materials and structures, Technical measurements and telemetry
What will be studied	The study of discipline enables, and treatments of results of tests providing of process of static tests of asms and knots of AC. Tools of static determination of durability of construction of AC and methods of work are with software.
Why it is interestingly/necessary to study	Realization be what tests is impossible without the corresponding instrumental and programmatic providing. Ability and experience with the vehicle and programmatic providing determine quality of results of tests.
Why it is possible to learn	Preparation of the vehicle and programmatic providing is for realization of static tests from determination of parameters of durability of asms of construction of AC. Preparation of current documentation that to testing
As possible to use the purchased knowledge and abilities	Ability of using software from testing is desirable experience for an aviation engineer, which is involved in the process of certification of aerotechics.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Static tests

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline requires students to have the knowledge and skills acquired during the study of the following disciplines: Higher mathematics, Physics, Aerodynamics of aircraft, Hydro-gas dynamics and thermodynamics
What will be studied	Methods of organization and realization of model experiment are for determination of actual arguments of durability of asms of construction of objects of aviation and space-rocket technique, and also parameters of functioning of the systems in operating terms, indicated in the norms of flying fitness for the corresponding types of AC; principles of planning of the measuring systems, intended for determination of parameters of durability.
Why it is interestingly/necessary to study	The study of discipline enables providing of process of planning and certification of object of air-space technique, in particular, to determine accordance to the requirements of norms of flying fitness for the concrete types of aircrafts by means of surface static tests of asms of construction. Static determination of durability of construction is especially important for the objects of misselry, in particular rockets-transmitters, as it is the only method of determination of durability of construction of asms of aerospace technique to implementation of flying tests.
Why it is possible to learn	To develop the programs and methods of realization of static tests and determination of descriptions of durability of asms of AC on the basis of results of tests; to develop the variants of the measuring systems, and also separate mechanical devices for intention of parameters of durability; to develop the algorithms of treatment of results of tests of durability of asms of construction of AC.
As possible to use the purchased knowledge and abilities	Static tests of durability of construction of AC are one of basic disciplines in industry of planning of aerospace technique. Knowledge and ability, that are acquired in the process of study of this discipline, allow to accept direct participation in the process of planning and certification of objects of aerotechics, allow to execute the calculation planning of objects of misselry, in particular, rockets-transmitters.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test

Dynamic tests

Department which provides teaching	Space engineering of ER IAT
Level of higher education	first (bachelor)
Course, semester	4 course, lent term
Volume of discipline and distribution of audience and independent work hours	4 credits of ECTS (120 hours), 36 hours audience work, 84 independent work hours
Teaching language	English
Requirements are to beginning of study of discipline	The study of this discipline requires students to have the knowledge and skills acquired during the study of the following disciplines: Higher mathematics, Physics, Aerodynamics of aircraft, Flight tests, Hydro-gas dynamics and thermodynamics.
What will be studied	Methods of organization and realization of model experiment are for determination of actual arguments of functioning of the systems of objects of aviation and space-rocket technique, and also parameters of functioning of the systems in operating terms, indicated in the norms of flying fitness for the corresponding types of AC; principles of planning of the measuring systems, intended for determination of parameters of dynamic tests.
Why it is interestingly/necessary to study	The study of discipline enables providing of process of planning and certification of object of air-space technique, in particular, to determine accordance of the systems of aircrafts to the requirements of norms of flying fitness by surface dynamic tests. Determination of dynamic descriptions of constituents of construction and systems of AC allows to get extraordinarily important information that to functioning of AC, and to provide the process of certification of AC.
Why it is possible to learn	To develop the programs and methods of realization of dynamic tests and determination of functionality of asms and systems of AC on the basis of results of dynamic surface tests; to develop the variants of the measuring systems, and also separate mechanical devices for intention of parameters of dynamic tests; to develop the algorithms of treatment of results of dynamic tests of asms and systems of construction of AC.
As possible to use the purchased knowledge and abilities	Results of dynamic tests of asms and systems of construction of AC are an evidential base for confirmation of accordance to the requirements of norms of flying fitness. Knowledge and ability, that are acquired in the process of study of this discipline, allow to accept direct participation in the process of planning and certification of objects of aerotechics, allow to execute the calculation planning of objects of aviation and rocket technique.
Informative providing of discipline	Syllabus (executable educational code of discipline), compendium of lectures
Type of semester control	Test