

IHA 102 UAV PROPULSION SYSTEMS SELECTION AND DESIGN

IHA 102 UAV PROPULSION SYSTEMS SELECTION AND DESIGN

COURSE DESCRIPTION

Course Level Associate Degree

Course Type COMPULSORY

The Aim of Course The aim of this course is; to enable students to comprehend the different propulsion systems, advantages and disadvantages used in UAVs, and to know the purposes and locations of different propulsion systems.

Course Content The aim of this course is to make students comprehend the propulsion systems used in unmanned aerial vehicle designs. In this context, the course content consists of the following topics;
ENGINES WORKING WITH CHEMICAL OR NUCLEAR ENERGY Heat Engine External Combustion Engine, Internal Combustion Engine Nano Engine Multi Fuel Engine Ion Engine, ELECTRIC ENGINES, PISTON ENGINES With Spark Ignition, Compression Ignition or Piston Movement (Including Rotational Linear, Horizontal Counterweight) Banked Radial Engine, Two-Stroke Engine Four-Stroke Engine, Hybrid-Electric UAV Modeling and Design Hybrid-Electric Configurations Series Hybrid Configuration Parallel Hybrid Configuration, Hybrid-Electric UAV Modeling and Design

Course Prerequisite The course does not have a prerequisite

Course Side Condition The course does not have a side condition.

Teaching Type Face to face

COURSE LEARNING OUTCOMES

1 Knows engines and types that work with chemical or nuclear energy.

2 Knows electric motors and their types.

3 Applies Hybrid-Electric UAV Modeling and Design.

IHA 102 UAV PROPULSION SYSTEMS SELECTION AND DESIGN

Course Name	Course Code	Term	Time	Theoretical	Practice	Credit	ECTS
UAV PROPULSION SYSTEMS SELECTION AND DESIGN	IHA102	1.	3	3	0	3	3
WEEKLY SUBJECTS							
WEEK	SUBJECTS						
1	ENGINES WORKING WITH CHEMICAL OR NUCLEAR ENERGY Heat Engine External Combustion						
2	ENGINES WORKING WITH CHEMICAL OR NUCLEAR ENERGY Engine Internal Combustion Engine						
3	MOTORS OPERATING WITH CHEMICAL OR NUCLEAR ENERGY Nano Engine Multi Fuel Engine Ion Engine						
4	ELECTRIC MOTORS						
5	PISTON ENGINES With Spark Ignition, Compression Ignition or Reciprocating Motion (Including Rotational)						
6	PISTON MOTORS Rotary Rotary Linear Horizontal Counter Multi Bank Radial Motor						
7	PISTON ENGINES Two Stroke Engine Four Stroke Engine						
8	MIDTERM						
9	Hybrid-Electric UAV Modeling and Design Hybrid-Electric Configurations Series Hybrid Configuration Parallel Hybrid Configuration						
10	Hybrid-Electric UAV Modeling and Design						
11	Series Parallel Configuration Components of Hybrid-Electric Drive Systems Propeller Electric motor Battery						
12	Hybrid-Electric Airplanes Unmanned Aircraft Projects Manned Aircraft Projects						
13	Modeling and Design of Hybrid-Electric Aircraft UAV Design Process Propulsion System Design						
14	General UAV Design Propulsion System Component Models						
15	Computational Analysis of Dispatch System Analysis Design Method Requirement Area Discovery						
16	FINAL EXAM						

IHA 104 COMPUTER AIDED DESIGN AND ANALYSIS

IHA 104 COMPUTER AIDED DESIGN AND ANALYSIS

COURSE DESCRIPTION

Course Level Associate Degree

Course Type COMPULSORY

The Aim of Course

The aim of this course is to design a machine and / or system for a desired purpose based on the information that students receive from different courses and to report it in a project format. The aim of this course is to enable students to use screen editing and drawing auxiliary commands, basic drawing commands, editing commands, dimensioning commands, and to gain competencies that can make data transformations and print out between computer-aided drawing programs.

Course Content

Contents of the course are screen editing commands, drawing auxiliary commands, creating and editing layers, using drawing commands and using, drawing commands and using, adding text to drawings, using coordinate systems in drawing stages, using editing commands, dimensioning commands, setting dimensioning and dimensioning writing, computer It covers topics such as data conversions between supported drawing programs, printer settings and printing. Fundamentals of machine design, concept development and innovation, determination of design input parameters, review of the basic information (Thermodynamics, Heat Transfer, Fluid Mechanics, Material, Strength, Machine Elements, 3D CAD) to be used in the realization of the design, design and preparation of solid model / manufacturing drawings , cost (economic) analysis, preparation of the project report, preparation of the project presentation (Powerpoint).

Course Prerequisite

The course does not have a prerequisite

Course Side Condition

The course does not have a side condition.

Teaching Type

Face to face

COURSE LEARNING OUTCOMES

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|-----------|-------------------------------------------------------------------------------------------------------------------|
| 1 | Will be able to explain general information about CAD programs. |
| 2 | Can define the system needs and hardware of CAD programs. |
| 3 | Can edit files in CAD programs. |
| 4 | Will be able to explain the representation tools required for architectural project presentation of CAD programs. |
| 5 | Explain the representation tools of CAD programs for two-dimensional (2D) drawing. |
| 6 | Explain the representation tools of CAD programs for three-dimensional (3D) drawing. |
| 7 | Explain the representation tools for visualization of CAD programs. |
| 8 | Will be able to explain commands for architectural drawing in CAD programs. |
| 9 | Explain drawing commands in CAD programs. |
| 10 | Describes drawing auxiliary commands in CAD programs. |
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IHA 104 COMPUTER AIDED DESIGN AND ANALYSISIHA 104
COMPUTER
AIDED
DESIGN
AND
ANALYSIS

Course Name	Course Code	Term	Time	Theoretical	Practice	Credit	ECTS
COMPUTER AIDED DESIGN AND ANALYSIS	IHA104	2.	3	1	2	3	3

WEEKLY SUBJECTS

WEEK	SUBJECTS
1	Fundamentals of Machine and Industrial Design
2	Concept Development and Innovation
3	Determination of design input parameters. Review of basic information to be used in design
4	Installation, presentation and usage areas of CAD program
5	Introducing the interface of CAD program and explaining the main topics in the program (File, edit, view, insert, format, tools, draw, dimension, modify, parametric, Windows, help, express) Editing settings (Options)
6	Explanation of 2D drawing tools (Draw tool bar commands)
7	Explanation of 2D drawing tools (Modify tool bar commands)
8	MIDTERM
9	Explaining the "layers" system in drawing in CAD Program
10	Explanation of 2D drawing tools (Dimension and draw order tool bar commands) Application of 2D drawing tools
11	Explanation of 3D modeling tools (Modeling toolbar commands)
12	Explanation of 3D modeling tools (View, orbit and visual styles toolbar commands)
13	Explanation of 3D modeling tools (Solid editing toolbar commands)
14	Rendering on the 3D model
15	Cost (economic) analysis, Economic cost analysis, Project final report preparation
16	FINAL EXAM

IHA 106 AERODYNAMIC AND AVIONIC SYSTEM DESIGN

IHA 106 AERODYNAMIC AND AVIONIC SYSTEM DESIGN

COURSE DESCRIPTION

Course Level Associate Degree

Course Type COMPULSORY

The Aim of Course

The aim of this course is; The aim of this course is to enable students to define basic principles of fluid mechanics, thermodynamics, atmosphere and aerodynamics, and to know the application areas of aerodynamics in general. Teaching of UAV Electric and Electronic Systems. Avionic Systems are Electrical and Electronic Systems on the aircraft. Students who take this course will be able to produce, distribute Electric Energy in UAV, Autopilot, Communication, Navigation, Indicator, Registration, Sensors etc. Will have information about their systems.

Course Content

The content of this course; It covers Physical Properties of Fluids, Aerostatic Atmosphere (Standard Atmosphere), Basic laws of Thermodynamics, Bernoulli equation and applications, Wing and Wing Profile Geometry, Basic flight performance. Avionic Systems; Radio control systems, Image systems, Ground control station components, GPS principles, Transponder Detect and Avoid Control systems, Useful loads and sensor systems

Course Prerequisite

The course does not have a prerequisite

Course Side Condition

The course does not have a side condition.

Teaching Type

Face to face

COURSE LEARNING OUTCOMES

1	Knows Basic Aerodynamic Systems.
2	Knows Aerodynamic Systems used in UAV and Aircraft.
3	Identify, define, formulate and solve basic problems related to the field.
4	It has advanced theoretical and practical knowledge, supported by books, tools and other resources containing up-to-date information about the field.
5	The field-related maintenance is carried out independently of a comprehensive advanced study.
6	Selects and uses the technical tools necessary for maintenance applications in the field.
7	To be able to use information and communication technologies with computer software at the level required by the field.
8	Sketch, scheme, graphic etc. defining the subject. to be able to read, understand and prepare documents.
9	It works effectively both in theoretical and applied fields in national and international aviation circles and in multi-disciplinary teams.
10	To have basic knowledge about the working principles of advanced aerodynamic systems.
11	Knows the avionic systems used in UAVs.
12	Knows avionic system types.
13	Make avionic system selection and design.
14	To have sufficient knowledge about avionic system standards.
15	Take responsibility to solve complex and unpredictable problems encountered in practice.
16	Uses technical drawing information effectively in practice.
17	To be able to use information and communication technologies with computer software at the level required by the field.
18	Sketch, scheme, graphic etc. defining the subject. to be able to read, understand and prepare documents.
19	To design basic Kalman filter and to design integrated navigation system with the help of Kalman filter
20	To have basic knowledge about the working principles of advanced avionic systems.

İHA 106 AERODYNAMIC AND AVIONIC SYSTEM DESIGN

Course Name	Course Code	Term	Time	Theoretical	Practice	Credit	ECTS
AERODYNAMIC AND AVIONIC SYSTEM DESIGN	IHA106	1.	3	3	0	3	3

Haftalık Konular

Hafta	Konular
1	Introduction to Aerodynamics Basic Concepts and Standard Atmosphere Aerodynamics and Wing Profiles; Basic Aerodynamics and applications Aerodynamics and Wing Profiles; Viscous Flow
2	Aerodynamics and Wing Profiles; Wing Profile Characteristics Aerodynamics and Wing Profiles; Wing Profile Characteristics Wings and Airplanes; Wings, Mechanisms that Increase Transport
3	Wings and Planes; All Airplane Transport, All Airplane Drag and Drag Pole Max Number Effects
4	Performance; Motion Equations, Impulse, Drag Curves, Ratio of Transport to Drag, Power Curves
5	Performance; Glide (Non-Motorized Flight), Climbing, Range and Endurance Calculations, Landing and Take-off, Turns V-n Diagrams. Stability and Control; Longitudinal Control Analysis Longitudinal Stability, Dynamic Longitudinal Stability,
6	Stability and Control; Longitudinal Control Analysis Longitudinal Stability, Dynamic Longitudinal Stability Stability and Control; Lateral-Directional Darkness, Dynamic Lateral-Directional Darkness
7	Stability and Control; Lateral-Directional Darkness, Dynamic Lateral-Directional Darkness
8	MIDTERM
9	Introduction to Avionics Avonik System Types Communication Systems
10	Radio wave propagation fundamentals, antennas, transmission lines, communication, receiver and transmitter systems
11	Inertial navigation principles Inertial navigation principles
12	Basic Radio-Navigation systems
13	Basic principles of GPS Other Global Satellite Navigation Systems (KUSS)
14	Modern Navigation Techniques (GBAS, SBAS, ELS / EHS, ADS-B In / Out) Other UAV system indicators.
15	Operating principles of UAV control systems Automatic Flight Systems
16	Automatic flight control and basic principles

IHA108 AVIATION MATERIALS

IHA108 AVIATION MATERIALS

COURSE DESCRIPTION

Course Level Associate Degree

Course Type COMPULSORY

The Aim of Course The aim of this course is; It is aimed to enable students to define the basic principles of material science and to know the application areas used in UAVs in general.

Course Content Classification of materials, Atomic structure, bonds between atoms, Bravais cage and lattice systems, Crystal errors, X-ray analysis method, Allotropy, Mechanical properties of metals, Mechanical tests applied to materials, Diffusion, Solidification, Methods of improving properties of metals, Cold and hot deformation, Break.

Course Prerequisite The course does not have a prerequisite

Course Side Condition The course does not have a side condition.

Teaching Type Face to face

COURSE LEARNING OUTCOMES

- 1 Will be able to define material properties and classification.
- 2 Will be able to explain the properties of metallic, ceramic, polymer and composite materials.
- 3 Will be able to define the atomic structure of solid materials, crystal structure errors.
- 4 Will be able to define primary and secondary atomic bonds
- 5 Will be able to explain the mechanical properties of metal materials.
- 6 Will be able to explain diffusion in solid materials.
- 7 Will be able to explain the heat treatment of metal materials.

8	Will be able to define the formation of corrosion.
9	Will be able to explain chemical corrosion.
10	To have basic knowledge about advanced material knowledge.

IHA108 AVIATION MATERIALS							
Course Name	Course Code	Term	Time	Theoretical	Practice	Credit	ECTS
AVIATION MATERIALS	IHA108	1.	3	3	0	3	3
WEEKLY SUBJECTS							
WEEK	SUBJECTS						
1	Materials science and Classification of materials. Matters to be considered in material selection.						
2	Atomic structure, Bonds between atoms, Crystal structures, Defects in solids.						
3	Diffusion, Mechanical properties of materials.						
4	Iron-containing materials: Properties and identification of steel alloys commonly used in aircraft structure						
5	Heat treatments applied to steels.						
6	Non-ferrous metals: Aluminum and its alloys, properties, heat treatments.						
7	Non-ferrous metals: Titanium alloys and Properties of superalloys.						
8	Midterm						
9	Non-metal materials other than wood and fabric, properties of composite materials						
10	Fatigue of Materials						
11	My ingredients creep						
12	Properties of other materials used in aircraft						
13	Properties of other materials used in aircraft						
14	Corrosion: Formation and types of corrosion						
15	Corrosion Protection Measures						
16	Final Exam						