AIR TRAFFIC CONTROL DEPARTMENT 2025-2026 COURSE CONTENTS

MAT1151 Mathematics I (4 – 0-4) 6 ECTS

Arithmetic terms and signs; methods of multiplication and division; fractions and decimals; factors and multipliers; weights, measures and conversion factors; ratio and proportion; averages and percentages; areas and volumes, squares, cubes; square and cube roots.

Lecture Book: Prof. Dr. Mustafa BALCI, "Meslek Yüksekokulu ve Teknik Eğitim Fakülteleri için Temel Matematik", Balcı Yayınları, 2008. Genel Matematik, M. Balcı, A.Ü. Fen Ed. Fak. Yayınları • Calculus, R.A.Adams, Vancouver, Canada , 1994

Auxilary Lecture Book: Kemal Temizyürek, Nurdan Çolakoğlu, "Meslek Yüksekokulları için Uygulamalı Matematik", Beta, 2009. • Çözümlü Matematik Analiz problemleri, M. Balcı, Balcı Yayınları

TRD109 Turkish Language-1 (2- 0-2) 2 ECTS

Dil kavramı. Dilin sosyal bir yapı olarak toplum hayatındaki yeri ve önemi. Dil-kültür ilişkisi. Kültür-uygarlık ilişkisi. Türkçenin dünya dilleri arasındaki yeri ve tarihi gelişimi. Sanat-yaratıcılık ve toplum. Türkiye türkçesinin grameri. Hece bilgisi. İmla kuralları . İmla kuralları. İmla kurallarının uygulanması. Noktalama işaretleri. Noktalama işaretleri. Noktalama işaretlerinin uygulanması

AİT101 Atatürk's Principles and Revolution History-1 (2- 0-2) 2 ECTS

Content and purpose of Atatürk's Principles and Revolution History. Innovation and similar concepts (Revolution, revolution, evolution, rebellion, reform). State structure of the Ottomans. Efforts to save the state and reform. Constitutional developments in the Ottoman Empire. Geopolitics and foreign policy of the Ottoman Empire. The coming to power of the Union and Progress Party. World War I and the Ottoman Empire's entry into the war. World War I and the Ottoman Empire's entry into the war. Mondros Armistice and the occupation of the country. Reactions to the occupations. Mustafa Kemal Pasha's passage to Anatolia. The Congress Period (Amasya Meeting, Erzurum and Sivas Congresses). Occupation of Istanbul

YDİ107 English-I (2- 0-2) 2 AKTS

Vocabulary: Countries and Nationalities – Grammar: Verb BE – Skills: Introducing yourself and others. Vocabulary: Daily routines – Grammar: Present Simple Statements. Reading: "A Day in My Life" – Writing Task: Write about your Daily routine. Vocabulary: Free Time Activities – Grammar: Present Simple Questions – Skills: Answer a Survey. Vocabulary: Free Time Activities – Grammar: Present Simple Questions – Skills: Answer a Survey. Skills: Introducing your family. Vocabulary: Places in a Town – Grammar: There is/There are. Skills: Describing a Town or a City. Vocabulary: Rooms and Furniture – Grammar: Present Continuous Tense. Skills: Describing a room. Vocabulary: Months of the Year – Grammar: can/can't. Skills: Writing an invitation. Vocabulary: Jobs – Grammar: Present Continuous vs. Present Simple. Skills: Describing a job.

HTK1101 Air Traffic Services (3-0-3) 5 ECTS

Transportation Systems and Air Transportation System. Air Traffic System. Air Traffic Management. Air Traffic Services. Air Traffic Control Service. General Air Traffic Rules. Flight Rules and Flight Levels. Altimeter Setting Methods. Flight Plans and Airspaces. Signals. Important Events in Air Traffic. Organizations

HTK1103 Introduction to Air Traffic Control (2-0-2) 3 ECTS

Introduction to the subjects, providing all information about the teaching process. Definition of air traffic control, international and national rules and regulations. Air traffic controller profession requirements Air traffic controller training process and licensing. Air traffic controller license requirements and career planning. National and international civil aviation organizations. Introduction to the air traffic control system. Airspaces, technical equipment, aircraft and human factors. Air and land sides of airports. Technical tour of the local airport. National and international aviation publications. Aerodrome control services. Approach and route control services.

HTK1105 Meteorology (3-0-3) 5 ECTS

History of Meteorology, Atmosphere. Pressure, Pressure Systems, Temperature, Inversion. Humidity, Density, Altimeter. Wind, Local Winds, General Circulation. Stability, Factors Restricting Meteorological Visibility, Synoptic Cards, Clouds and Precipitation. Thunderstorm, Tropopause, Turbulence. Jet Streams, Icing. Air Masses, Fronts. Meteorological Documents for Flight, METAR. SPECI, TAF, SIGMET, AIRMET. Meteorological Cards

HTK1107 Basic Information Technology (2-2-3) 5 ECTS

What is a Computer? Basic Concepts. Internet Usage. Hardware/Software. Search Engines, E-mail. Word Introduction. Word File, Add Entry Menu. Word Page Layout. Word Tables. Introduction to Excel. Functions (Sum, Average, Min, Max, etc.). Graphics. Introduction to Power Point. Design, Transition, Animation menus

MAT1152 Mathematics II (4 – 0-4) 6 ECTS

Evaluation of simple algebraic expressions, addition, subtraction, multiplication and division; linear equations and their solutions, linear equations in one variable, linear systems of equations in two variables; formulas, functions and graphs; mathematical operations with logarithms, calculations with logarithms, natural logarithms; number systems, exponents, mathematical transformations of number systems; geometry, simple geometric structures; graphs, graphical representation; properties and uses of graphs, equation/function graphs; trigonometry, simple trigonometry; trigonometric relationships; use of tables and orthogonal and polar coordinates;

Lecture Book: Prof. Dr. Mustafa BALCI, "Meslek Yüksekokulu ve Teknik Eğitim Fakülteleri için Temel Matematik", Balcı Yayınları, 2008. • Genel Matematik, M. Balcı, A.Ü. Fen Ed. Fak.

Auxilary Lecture Book: Calculus, R.A.Adams, Vancouver,Canada , 1994 • Advanced Calculus, Schaum's outlines. • Çözümlü Matematik Analiz problemleri, M. Balcı, Balcı Yayınları Ders Notları

TRD110 Turkish Language-II (2- 0-2) 2 ECTS

Morphology (Noun roots, verb roots, dual roots). Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Parentheses (parentheses), square brackets. Morphology (Suffixes in Turkish that make nouns from nouns, suffixes that make verbs from nouns). Presentation, poetry, essay, composition, story,

newspaper, magazine studies and applications, book introductions. Writing of numbers. Morphology (Suffixes that make nouns from verbs, suffixes that make verbs from verbs). Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Correction mark. Morphology (Inflectional suffixes, inflectional suffixes added to nouns, inflectional suffixes added to verbs). Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Apostrophe. Word groups. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Writing of words that do not fit at the end of the line. Word groups. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Quotation mark. Sentence (Sentence elements: predicate, subject, object, indirect object, adverbial modifier). Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Ellipsis, oblique stroke. Sentence (Sentence types: Simple sentence, compound sentence, sequential sentence, linked sentence). Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Hyphen, dash. Sentence (Sentence types, sentence analysis) Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Writing of foreign proper nouns. Expression disorders. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Exclamation mark. Expression disorders. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Writing of infinitive suffixes. Forms of expression. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Application of punctuation marks. Review articles, forms of expression. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Application of punctuation marks. Forms of expression. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Application of punctuation marks. Review articles, forms of expression. Presentation, poetry, essay, composition, story, newspaper, magazine studies and applications, book introductions. Application of punctuation marks.

AİT102 Atatürk's Principles and History of Revolution-II (2-0-2) 2 ECTS

Abolition of the Sultanate and the declaration of the Republic. Renewal of Elections and Establishment of the People's Party. Abolition of the Caliphate-Unity of Education Law. Reforms in the Field of Law (3 Revolution Laws, 1924 Constitution, Civil Code and Penal

Code). Reforms in the Field of Education and Culture (National Education Organization, Public Education, Foreign Schools, Alphabet Revolution, Turkish Language and History Societies). Reforms in the Social Field. (Women's Rights, Dress Code, Closure of Dervish Lodges, Calendar, Clock, Units of Measure and Weight). Regulations in the Field of Health and Social Assistance. Regulations Made in the Economic Sector (Industry and commerce, Industry Encouragement Law, İş Bankası, Agriculture and transportation activities) Regulations Made in the Economic Sector, (Fiscal policy, Customs and Taxes, Turkish Currency Protection Law, Census and SIS, Statism and Planned Development). Multi-Party System Experiments. Opening of the Turkish Grand National Assembly and Taking Over the Administration in Anatolia. Opening of the Turkish Grand National Assembly and Taking Over the Administration in Anatolia. Transition to the Multi-Party System. Reactions to the Turkish Revolution and the Republic.

YDİ108 English-II (2- 0-2) 2 ECTS

Vocabulary: Events and Places to Go. Grammar: Past Simple, Verb BE. Vocabulary: School Subjects. Grammar: Past Simple Statements. Reading: "The New Eric" – Writing Task: Write about your education. Vocabulary: Parts of the Body. Grammar: Past Simple Questions. Vocabulary: Travel – Grammar: Future Tense with Be+going to. Reading: "Big Plans". Writing: Write about future plans. Vocabulary: Food – Grammar: Countable/Uncountable Nouns. Reading: "Breakfast Around the World. Writing: Write about your meal. Vocabulary: Clothes – Grammar: Adjectives. Reading: "Work Clothes". Writing: Describe people's clothing. Vocabulary: Weather – Grammar: Comparatives. Reading: "Seattle My New Home". Writing: Compare different places. Vocabulary: Geographical Features. – Grammar: Superlatives. Reading: "New Zealand". Writing: Describe a country.

HTK1102 Aerodrome Control Methods (5-0-5) 8 ECTS

Guiding information-definitions about aerodromes. Sections of air traffic services, general procedures. FIR-CTA-CTR-TMA-MTMA-SID-STAR. VFR-Special VFR-IFR rules, communication procedures in Turkish Airspace. Arrival of aircraft without radio and use of light signals. Arrival of aircraft without radio and use of light signals. IFR and VFR landing and take-off procedures. Functions of aerodrome control towers. Local traffic regulations and

thesis. Information given to aircraft by aerodrome control towers. Cooperation between units. Cooperation between units. Departure and arrival traffic separations. Strip filling

HTK1104 Communication and Navigation Systems (4-0-4) 5 ECTS

Magnetic Field, Electromagnetic Waves. Radio Waves, Types of Electromagnetic Waves. Radio-Sound Waves. Basic Concepts (Frequency, Period). Modulation. Refraction, reflection, absorption etc. properties in Radio Waves. Antennas, Receivers-Transmitters. Communication Components. VHF, HF Communication System. Sound Systems, ELT. CVR, FDR. GPS, GNSS, RNAV. VOR, ADF, ILS, DME. FMS, Omega Loran, TACAN

HTK1106 Aircraft Information (3-0-3) 5 ECTS

Basic Concepts and principles. Basic Concepts and Flight concept. Basic concepts, Aircraft elements, Stresses acting on structural elements. Aircraft elements – structural classification, numbering methods, materials used in aircraft. Aircraft elements – materials used in aircraft. Wing, Wing types. Wing structural elements. Body, body structures, structural elements. Landing gear. Engine types. Aircraft engines. Flight control surfaces, Lift augmentation devices. Balance stability in aircraft. High speed flights

HTK2153 Linear Algebra and Analytical Geometry (2-0-2) 3 ECTS

Matrix concept and operations with matrices. Determinants. Rank and dimension. Linear equation systems. Linear equation systems and solution methods. Vectors and vector algebra. Vector spaces. Scalar (inner) product of vectors. Vector product of vectors. Coordinate systems. Coordinate transformations in the plane. Line and plane in space. Eigenvalues and vectors

HTK2101 Algorithm and Programming (2-2-3) 5 ECTS

What is a computer? Hardware/Software Concepts. Algorithm and Program development. Algorithm structures. Flowchart. Introduction to Python. Variables. Print function, Description sentences. Arithmetic operations. Input function. Comparison operators. Conditional expressions. Loops. Functions

HTK2103 Aerodrome Control Simulation I (2-4-4) 7 ECTS

VFR departure applications. IFR and VFR departure applications. VFR arrival applications. IFR and VFR arrival applications. IFR and VFR arrival applications. IFR, VFR and Touch&go; separation applications. IFR and VFR departure separation applications. IFR and VFR arrival separation applications. IFR and VFR arrival separation applications. Heavy traffic applications. Heavy traffic applications. Parallel runway operation applications. Parallel runway operation applications. Parallel runway operation applications.

HTK2015 English Speaking Skills I (3-0-3) 4 ECTS

Introduction, short vowel sounds, prepositions of place. Making sentences using short vowel sounds, prepositions of place, basic vocabulary study related to aircraft. Continuation of vocabulary study related to vowel sounds, prepositions of place and aircraft. Short exam, vocabulary study related to vowel sounds, prepositions of time and airport. Pronunciation of consonant th sound, airport vocabulary study, ATC listening activity. Pronunciation of vowel th sound, airport vocabulary study, ATC listening activity. Pronunciation of w/v sounds, vocabulary study related to emergencies, ATC listening activity. Pronunciation of w/v/f sounds, vocabulary study related to weather conditions, ATC listening activity. quiz, past tense ed pronunciation, authentic ATC listening. past tense ed pronunciation continued, present perfect tense study, authentic ATC listening. t/ d pronunciation, present perfect tense continued, pair studies. pair studies and repetition

HTK2107 Airports (3-0-3) 4 ECTS

Explanation of the definitions of the basic concepts to be covered in the course, introduction of Annex 14 document, Abbreviations and symbols, Airport reference code, Airport data. Strength of pavements, ACN-PCN value calculation, visual approach slope indicator systems, Runways, Runway end safety areas, Runway width, Instrument runways. Runway configurations, Factors related to the positioning, direction and number of runways, Runway length considerations. Parallel runway operations, Aircraft take-off movement, take-off length requirement. Taxiway systems, Aircraft stand taxi lane, Apron taxiway, rapid exit taxiway, end around taxiways. Taxiway intersections and turns, over bridge taxiways, taxiway configurations. Holding bays and other secondary roads, Dual taxiways, Dual runway entrances. Aprons, design

requirements, passenger terminal apron concepts, de-icing/anti-icing facilities. Visual aids for navigation, Airport capacity, Case studies of airport development studies. Seminar with external participants. Obstacle restrictions and removal. Heliports. Environmental impacts of airports. Airport inspection visit.

HTK2109 Air Traffic Management (3-0-3) 4 ECTS

The emergence and development of the concept of air traffic management, the history of air traffic control, the development of air transportation. Definitions and components of air traffic management, air traffic services; air traffic control, warning services, flight information services. Components of air traffic control system, airspace, technical equipment, aircraft, human factors. Air traffic flow management and airspace management. Air traffic flow management and airspace management. Air traffic management functions, organization, planning, control, coordination and personnel. Capacity and efficiency definitions for air traffic control system. Air traffic management problems; performance, safety, capacity, efficiency, cost efficiency. Solution methods. The importance of SIMMOD and RAMS simulation models in problem solving. The importance of SIMMOD and RAMS simulation models in problem solving. Future air navigation systems, CNS/ATM and FANS. Eurocontrol and ongoing projects. SESAR.

HTK2111 Aeronautical Information Management (3-0-3) 4 ECTS

Explanation of the concept of aeronautical information management. Paris Convention, Chicago Convention. ICAO objectives. Integrated Aeronautical Information Package. Aeronautical Information Publication (AIP). Aeronautical Information Circulars (AIC). AIP Annexes (AIP SUP/AIRAC SUP). AIP Amendments (AIP AMDT/AIRAC AMDT). NOTAM, SNOWTAM, ASHTAM, TRIGGER NOTAM. Pre-flight information, Post-flight information. Aeronautical Information Management communication tools. Flight Plan. (FPL). NOTAM and SNOWTAM creation. NOTAM and SNOWTAM creation.

HTK2113 Sustainable Transportation Systems (3-0-3) 4 ECTS

Historical development of sustainability. Industrial ecology and green development. Necessity of sustainable environmental policy. Turkey's environmental policies and sustainable development. Sustainable urbanization. Smart city applications. Sustainable transportation. Sustainable energy. Carbon footprint reduction studies. Electric vehicles, smart vehicles. Sustainability technologies in aviation. Green airport design. Environmental management system (EMS) applications of airports in Turkey. Corporate sustainability in aviation. Smart systems in air traffic control. Components and architecture of smart transportation systems. Multimodal trip management and regional passenger information systems. Traffic management systems. Accident-breakdown management and emergency management systems. Advanced passenger information systems. (Midterm Exam) Electronic payment systems and congestion charging. Vehicle-based safety and control systems. Advanced public transportation systems. Commercial vehicle control systems. Weather information systems. Navigation systems. Dynamic route routing. Highway traffic control. Smart transportation systems in dynamic network modeling. Sustainable traffic perception in society. Migration policies. Human mobility and sustainable traffic.

HTK2115 Alternative Energy Sources (3-0-3) 4 ECTS

Introduction to alternative energy sources. Solar energy and its applications. Wind energy and systems. Hydroelectric energy systems. Solar thermal systems. Solar collectors and efficiency analyses. Biomass energy and biogas systems. Geothermal energy and its applications. Hydrogen energy systems. Energy storage technologies. Fuel cell systems. Hybrid energy systems. Alternative energy economy and policies. General review and evaluation.

HTK2102 Non-Radar Control Methods (5-0-5) 5 ECTS

Air Traffic Management. Air Traffic Services. Vertical and Horizontal Separation. Vertical and horizontal separation. Speed techniques. Arrival and departure traffic and minimals. procedural problem solutions. Physiology. Unusual situations.

HTK2112 Hava Trafik Kontrolü İçin Mekanik (3-0-3) 4 AKTS

Dersin Tanıtma. Parçacığın statiği. Rijit Cisimler. Eşdeğer Kuvvet sistemleri. Rijit cisimlerin dengesi. Rijit cisimlerin dengesi. Yapıların analizi. Yapıların analizi. Dağılmış Yükler, Ağırlık Merkezi. Kirişler ve Kablolar. Uygulama Örnekleri. Sürtünme. Uygulamalar. Statik Problem Çözme

HTK2104 Navigation (3-0-3) 3 ECTS

General Navigation Factors, Properties and Types. Solar System. Earth, Great Circle, Rhumb Line. Latitude, Longitude and Their Differences. Time, Time Types and Time Conversions. Calculation of navigation and its main elements; Heading, altitude, Time, distance and Speed types. Magnetism and Compasses. Heading/Direction, Heading types, Deviation, Fall, Heading-Deviation-Fall calculations. Distance and Distance Calculations, Convergence/Intersection Angle. Finding the position, Unit conversions, Approach problems, Critical point/Safe turning point calculations. Climb Calculations, Calculation of descent rates, Time-distance calculations to the station, Wind fall and corrections. Map projections, Maps, Scale, Representation Value. Flight Planning. Flight Computer Usage; Calculations related to back/wind

HTK2106 Aerodrome Control Simulation II (2-4-4) 7 ECTS

Runway change, congested traffic. Runway change, congested traffic. Counter-departures, coordination with approach control unit. Counter-departures, coordination with approach control unit. Simulator application in one position before the exam.. Different aerodrome introduction and extraordinary situations. Emergency situations and coordination with relevant units. Air traffic operation in night conditions. Use of runways in different ways. Simulator application in one position before the exam. Emergency management and CTOT applications.

HTK2108 English Speaking Skills II (3-0-3) 4 ECTS

Review of aviation terms, warning in emergency situations. Events during navigation, operational situations, difference between present perfect and past simple tenses. Events during navigation, extraordinary situations, mentioning probability, comparative adjectives. Events during navigation, medical conditions, infinitive forms in English. Contact and approach, descent, subjunctive conditions, real situations in present tense. Contact and approach, weather

conditions, subjunctive conditions, unreal situations in present tense. Contact and approach, approach and landing problems, future tense forms. Talking about landing, events during landing, cause and effect relationships. (Midterm exam) - Landing, joining the circuit, articles. Possible dangers during landing, indirect speech. Conditions on the ground, taxiing, explaining events, adjectives. Conditions on the ground, moving to the gate, adverbs. Conditions on the ground, clarity in communication, differences between adjectives and adverbs. Expressing what will happen, repetition of the course.

HTK2110 Flight Mechanics and Aircraft Performance (3-0-3) 4 ECTS

Performance characteristics of aircraft power systems. General aircraft performance: Takeoff and Climb. General aircraft performance: Travel and Landing. Performance of Single-Engine Class B aircraft – Takeoff and Climb. Performance of single-engine Class B aeroplanes – Travel and landing. Performance of multi-engine Class B aeroplanes – Take-off and climb. Performance of multi-engine Class B aeroplanes – Travel and landing. JAR/FAR 25 Class A aeroplanes, general information. Review of previous topics. Take-off performance. Climb performance. Travel performance. Descent and landing performance. Maneuvers

HTK2114 Air Traffic Communication and Information Management (3-0-3) 4 ECTS

Aviation Communication and History, Aeronautical Information Management Concepts. Paris Convention, Chicago Convention, ICAO, ITU, SITA. Integrated Aeronautical Information Package (AIP), Annexes and Amendments, Aeronautical Information Circulars. Abbreviations and Codes, Position Indicators, Aircraft Type Identifiers. Flight Plan (FPL). NOTAM types and Operational Applications. NOTAM, SNOWTAM and Flight Plan Applications. Aeronautical Information Management Communication Tools. Aeronautical Fixed Services (AFS), ICAO Common Data Interchange Network (CIDIN). Aeronautical Fixed Communications Network (AFTN), Flight Information Processing (FDP). Aeronautical Mobile System (AMS), Radio Communication, Controller/Pilot Data Link Communication (CPDLC). Selective Calling System (SELCAL). Aviation Physiology

HTK2116 Aerodynamics (3-0-3) 4 ECTS

Atmospheric Physics: Layers of the atmosphere; gas composition; temperature, pressure and density change with altitude. Atmospheric Physics: Gas laws; speed of sound; Mach number; International Standard Atmosphere (ISA) model. Aerodynamics: Streamlines; Bernoulli

equation; Venturi effect; continuity equation. Aerodynamics: Airfoil definitions; angle of attack; lift and drag forces. Aerodynamics: Wing geometry - sweep angle; taper ratio; mean aerodynamic chord; extension ratio. Aerodynamics: Drag types - parasitic, induced, wave; total drag curve. Aerodynamics: Polar curves; pressure distribution; stall (critical angle of attack). Flight Theory: Level flight stability; relationship between center of pressure and center of gravity. Flight Theory: Climb and landing equations; slip angle; range calculation; altitude effect. Flight Theory: Turning forces; load factor; slip and skid. Flight Theory: Flight envelope (V-n diagram); structural speed and limit values. Flight Theory: High-lift systems – wings, slats; wing tip arrangements; ground effect. Flight Stability and Dynamics: Static and dynamic stability; longitudinal, lateral, directional stability. Flight Stability and Dynamics: Trim systems; Dutch roll; three-axis balance.

HTK2118 Introduction to Unmanned Aerial Vehicle Technologies (3-0-3) 4 ECTS

UAV components and system architecture. Basic flight principles and aerodynamic rules. Rotor types and multi-rotor systems. Electric and internal combustion engines. Wing and propeller profiles. Fuel systems and LIPO batteries. Servo systems and control mechanisms. Constraints affecting flight performance. Command and control systems: manual and visual flight. Autonomous flight and flight control modes. Instrumentation and flight equipment. Mass and balance calculations. Practical scenarios and field simulations. General review and evaluation.

HTK3101 Instrument Flight Methods (4-0-4) 4 ECTS

General criteria: Speed., Aircraft Categories, Turning performance, Wind effect and wind spiral, Fix and fix tolerances, Flight technical tolerances, Minimum obstacle safety margin, Minimum sector altitudes. Conventional Holding Procedures. Instrument approach. Instrument approach phases: Arrival, Initial approach, Intermediate approach, Final approach, Missed approach. Racetrack and change of direction maneuvers. Non-precision approach: Protection areas, Obstacle clearance, Circling approach areas. Precision approach. Obstacle assessment surfaces (OAS), Determination of OCA/OCH value. Take-off procedures. Area Navigation (RNAV) Procedures: VOR/DME RNAV, DME/DME RNAV, GNSS RNAV. Open and closed RNAV STAR. IAC Design-Project work. Project presentations and evaluation.

HTK3103 Trajectory Analysis and Prediction (2-0-2) 2 ECTS

Course principles; Basic concepts and definitions. Trajectory Analysis and Prediction in Air Traffic Control: Time Horizon and Avoidance; Trajectory Prediction Process and Components; Introduction to Trajectory Analysis. Aircraft Equations of Motion: Assumptions and Coordinate Systems; Kinematic Equations; Dynamic Equations; Aircraft Performance Parameters; Weight Equation; Power Pack Characteristics; Discussion of Three-Dimensional Flight; Flight on a Spherical Earth; Flight in a Moving Atmosphere. Analysis of Cruise Trajectories-I: Speed Ranges and Limits; Flight Limits; Trajectory Optimization, Flight Envelope; Quasi-permanent Cruise; Point Cruise Performance; Cruise Programs; Optimal Cruise Trajectories: Cruise at Maximum Range and Cruise at Maximum Endurance. Analysis of Cruise Trajectories-II: Operational Cruise Trajectories: Constant Speed-Constant Altitude Cruise; Restricted Speed Cruise; Step Climb Cruise. Analysis of Climb Trajectories-I: Point Climb Performance; Optimal Climb Trajectories: Steepest Climb, Fastest Climb and Most Economical Climb. Analysis of Climb Trajectories-II: Operational Climb Trajectories: Climb with Constant Indicated Speed and Mach Number; Procedural and Operational Limiters for Turbojet and Turbofan Aircraft; Optimal and Operational Climb Trajectories. Analysis of Descent Trajectories: Descent Motion; Operational Descent Trajectories; Descent with Maximum Range and Endurance. Maneuvering Performance-I: Takeoff and Landing; Accelerated Climb; Energy Method; Maneuvering Capability; Maneuvering Envelope. Maneuvering Performance-II: Turning Motion; Coordinated Turning Motion, Limiters. Trajectory Analysis Models: Deterministic Models; Kinematic Models; Dynamic Models; Energy Model, Stochastic Models. Factors Affecting Trajectory Analysis: Uncertainties and Errors; Wind and Weather Conditions; Instrument Errors; Aircraft Performance; Traffic Density and Procedures; Conflict Detection and Resolution; Horizontal and Vertical Plane Avoidance Maneuvers; Decision Support Systems

HTK3105 Non-Radar Approach Control Simulation (4-4-6) 7 ECTS

Airspace and procedure recognition. Area control and coordination with tower. Transit traffics. Aircraft flying on the same, intersecting and reciprocal routes. Arrival traffics. Departure traffics. Separation of arrival traffics from transit traffics. Separation of departure traffics from transit traffics. Separation between arrival and departure traffics. Complex traffic solutions. Complex traffic solutions. Emergencies. Emergencies. Emergencies

HTK3107 English Speaking Skills III (3-0-3) 4 ECTS

Close passage: vocabulary, listening activity and pair work. Special flights: vocabulary, listening activity and pair work. Delays: vocabulary, listening activity and pair work. Landing on the fuselage: vocabulary, listening activity and pair work. Birds: vocabulary, listening activity and pair work. Fire on the plane: vocabulary, listening activity and pair work. Ground motion accidents: vocabulary, listening activity and pair work. Pilot becoming disabled: vocabulary, listening activity and pair work. Controlled landing of a distressed aircraft at sea: vocabulary, listening activity and pair work. Animals at the airport: vocabulary, listening activity and pair work. Icing: vocabulary, listening activity and pair work. Storms: vocabulary, listening activity and pair work. Emergency scenarios study.

HTK3109 Radar Control Methods (4-0-4) 5 ECTS

DOC 4444 Important concepts for air traffic control in PANS-ATM. Air Traffic Control: aerodrome control unit, approach control unit, en route control unit. Altimeter setting methods and transponder. Use of ATS Surveillance System in air traffic control services. PSR, SSR and ADS-B radar definition methods. MRVA charts, Instrument approach charts (IAC), En route maps, En route minima, vector on approach line. Radar coordination and traffic handover. Vectoring methods in ATS surveillance system and operations on parallel or near parallel runways. Separation minima in ATS surveillance system. Level allocations for approach and en route control in radar. Radar traffic information, Speed restrictions, Radar frequency. Emergency situations in radar.

HTK3111 Airline Transportation Management (4-0-4) 5 ECTS

Introduction to airline transportation management course, structure and characteristics of carriers. Elements and organization of airline management. Elements and organization of airline management. Airline passenger marketing. Airline passenger forecasting methods. Airline passenger forecasting methods. Airline ticket pricing. Airline ticket pricing. Determination of airline flights. Advertising in airline companies. Advertising in airline companies. Airline fleet planning. Commercial air transportation. Commercial air transportation

HTK3113 Mathematical and Statistical Methods in Decision Making (4-0-4) 5 ECTS

Introduction to statistics. Descriptive statistics: Tables, Graphs. Measures of central tendency. Measures of variability. Probability; Random Variables. Random Variables and Probability Distributions, Expected value of random variable, variance. Discrete Random Variable and

Probability distributions. Bernoulli, Binomial, Poisson etc. distributions. Continuous Random Variable and Probability Distributions for Continuous Random Variables. Uniform, Exponential and Normal distributions. Sampling and Sampling Distributions. Point and Interval Estimation. Hypothesis Tests. Regression; Some Nonparametric Tests

HTK3115 Digital Transformation in Aviation (4-0-4) 5 ECTS

The concept of digital transformation and its historical development in aviation. Digital systems and SWIM architecture in air traffic management. Big data, data analytics and decision support systems. Artificial intelligence and machine learning applications. Unmanned aerial vehicles and UTM systems. Autonomous flight technologies and AI-supported decision making. Cybersecurity and information security risks in aviation. IoT systems and smart airport applications. Use of blockchain technology in aviation. Simulation systems and augmented/virtual reality (XR). Carbon neutral aviation targets and digital sustainability solutions. The impact of human factors and automation in digital transformation. Future digital trends: digital twins, edge computing, quantum technologies. Case studies and sectoral application examples (THY, EUROCONTROL, ICAO)

HTK3117 Human Computer Interaction (4-0-4) 5 ECTS

Introduction and Basic Concepts of Human-Computer Interaction in Aviation. User-Centered Design and Controller/Pilot User Profiles. Interaction Design Principles and Application to Aviation Systems. Prototyping and Simulation Tools in Cockpit and Air Traffic Control Systems. Usability and Evaluation Methods in Aviation Systems. Human Perception, Reaction Time and Cognitive Load: Flight Safety Perspective. Flight Management Systems (FMS) and Digital Interface Design. Midterm Exam. Interaction with Mobile Devices and Assistive Applications (e.g. pilot EFB systems). Simulator Design and Project Management Processes in Terms of HCI. Visual Design Principles and Information Hierarchy (EFIS, radar screens etc.). Ergonomics and Design of Rapid Information Presentation in Critical Situations. Advanced Interaction Techniques: Touch, Voice and Eye Tracking Systems. Air Traffic and Cockpit Scenarios with Real Time User Tests

HTK3102 Human Factors in Aviation (3-0-3) 5 ECTS

Human in civil aviation system, aviation safety -human factors. Human factors-Human error Error models. Error models. Controller performance factors affecting performance. Human

information processing. Individual differences. Organizational factors. Stress. Automation. Human machine interaction. Workload. Future systems and human factors

HTK3104 Non-Radar Area Control Simulation (4-4-6) 7 ECTS

Airspace and procedures recognition. Approach control and coordination with the tower. Transit traffics. Aircraft flying on the same, intersecting and reciprocal routes. Arrival traffics. Departure traffics. Separation of arrival traffics from transit traffics. Separation of departure traffics from transit traffics. Separation between arrival and departure traffics. Complex traffic solutions. Unexpected / emergency applications. Unexpected / emergency applications. Complex traffic applications. Complex traffic applications

HTK3106 Air Law (2-0-2) 3 ECTS

Introduction to Air Law: Definition, classification, history, sources of air law. International and regional organizations: (ICAO), (IATA), (ECAC), Eurocontrol, (JAA) etc. Convention on International Civil Aviation (Chicago Convention). Air carrier's liability: Warsaw Convention and Hague Protocol, Montreal Convention. Turkish Civil Aviation Legislation; Aircraft: Concept and Types, Legal Nature of Aircraft. Identity, Nationality, Registry of Aircraft. Ownership of Aircraft. Air Transport Agreement. (Midterm exam) Passenger rights in air transport. Aircraft Operator, Liability of the Operator. International agreements against aviation safety. Bilateral air transport agreements. Aviation insurances. Competition and Cooperation Regulations in Air Transport.

HTK3108 English Speaking Skills IV (3-0-3) 4 ECTS

Loss of pressure: vocabulary, listening activity and pair work. Problems caused by passengers: vocabulary, listening activity and pair work. Possibility of bomb: vocabulary, listening activity and pair work. Take-off accidents: vocabulary, listening activity and pair work. Getting lost: vocabulary, listening activity and pair work. Aircraft failure-mechanical: vocabulary, listening activity and pair work. Aircraft failure-electrical: vocabulary, listening activity and pair work. Volcanoes: word study, listening activity and pair work. Collisions: word study, listening activity and pair work. Fuel problems: word study, listening activity and pair work. Airport activities: word study, listening activity and pair work. Airport environment: word study,

listening activity and pair work. Airport and navigation equipment failure: word study, listening activity and pair work.

HTK3110 Aircraft Display Systems (3-0-3) 4 ECTS

Aircraft Display Types Pressure Inputs. Air Speed Indicator, Pressure Altimeter. Vertical speed indicator. Magnetism. Magnetic Compass. Gyroscope, Gyroscopic direction indicator. Artificial horizon. Turn Belt Indicator; Turn Coordinator. Remote display compass, air temperature indicator, angle of attack indicator. Inertial platform, Navigation system. Inertial platform, Navigation system, inertial reference system. Inertial Platform Reference System. Air Data Computer. Engine and System Indicators. Central Electronic Display Systems

HTK3112 Helicopter Basics (3-0-3) 4 ECTS

Definition, types and areas of use of helicopter. Helicopter main rotor. Helicopter tail rotor. Forces acting on the helicopter. Swashplate. Flight of the helicopter. Cyclic and collective control. Yaw control, anti-torque control, tail rotor. Main rotor, tail rotor, structure and features. Autorotation. Operation limits. Speed limit, altitude limit. Flight of the helicopter, ground effect, stall.

HTK3116 Flight Simulation (3-0-3) 4 ECTS

Introduction to Manned/Unmanned Aircraft Systems ground control stations, pilot stations and sensor operator stations. Organization of a typical unmanned aircraft ground control station. Aircraft simulation applications. Flight controls, sensor controls. Human factors between personnel and man/machine. Use of ground station interface. Aircraft simulation applications.

HTK3118 Augmented Reality Applications (3-0-3) 4 ECTS

The concept, history and basic technologies of Augmented Reality (AR). The place of AR in air traffic control and its potential application areas. AR devices, sensors and data processing infrastructure. Airspace visualization: AR-supported systems for tower and radar controllers. Tracking and management of airport surface movements with AR. Augmented reality-supported information presentation in pilot-ATC interaction. Training and simulations of air

traffic scenarios with AR. Evaluation of AR technologies in terms of human factors. User interface design and ergonomics in AR systems. Presentation of flight data, meteorological information and weather layers in AR environment. Performance evaluation and testing methods of AR systems. Security, fault tolerance and data integrity in AR applications. Integration of AR into air traffic control curriculum and its role in education. Current AR projects, sectoral examples and student project presentations

HTK4101 Operational Environment (2-0-2) 3 ECTS

Airport Elements and Technical Departments. Airport Elements and Technical Departments. Airport Terminal Models. Airport Passenger Buildings and Support Facilities. Airport Passenger Buildings and Support Facilities. Airspaces. Flexible Use of Airspace. Airport Planning. Airport Planning. Negative Effects of Airports on Urban Landscape. Effects of Airports on Noise Pollution. Effects of Airports on Noise Pollution. Effects of Airports on Air Pollution. Effects of Airports on Water Pollution

HTK4103 Radar Approach Control Simulation (4-4-6) 9 ECTS

Synthetic Airspace Introduction, traffic definition and traffic transfer procedures. Receiving and vectoring techniques of transferred landing/departure traffic. Introduction of entry/exit points, MRVA values, prohibited/restricted/dangerous areas, area of responsibility and transfer procedures of the synthetic area to be used. Provision of Air Traffic Control, Flight Information and Alert services to IFR and VFR traffic within TMA. Procedures for providing Air Traffic Control services to IFR traffic within TMA. Level/altitude allocation applications for IFR-VFR traffic within TMA. Separation applications between IFR traffic within TMA. Systems to increase flight safety, ACAS, MTCA, STCA. Speed restriction applications used for different types and performances of IFR traffic. Applications for avoiding aircraft from adverse weather conditions in IFR and VFR traffic within TMA. What to do in the face of reductions in ATC system capacities. Unexpected/emergency applications. Complex traffic applications. Complex traffic applications.

HTK4105 Unmanned Aerial Vehicles (3-0-3) 4 ECTS

Basic concepts and history. Unmanned and autonomous vehicles used in air, sea, land and space. UAV system components, UAV, ground control station. UAV system components, UAV, ground control station. UAV classification. National and international studies and legal legislation: EASA, FAA, SHGM UAV legislation. Unmanned aerial vehicles and regulations in air traffic control. Simulator technologies. Safe separation: airspace and requirements. (Midterm exam) Effects of tail turbulence, safety layers. Operational concepts: general requirements, flight operations, unexpected events. Guidelines, regulatory standards and practical operational considerations for aerial photography and videography techniques specific to the use of Unmanned Aircraft Systems. Guidelines, regulatory standards and practical operational considerations for aerial photography and videography techniques specific to the use of Unmanned Aircraft Systems. Current procedures and related practical application methods.

HTK4107 English Speaking Skills V (3-0-3) 4 ECTS

Being able to report accidents, communication errors: repetition and listening errors. Recommendations for pilots and air traffic controllers to avoid level problems. US Airways Flight 1549. Decision-making games, decision-making and language barriers. Effects of stress. Being able to convey information during shift change using indirect speech. Runway movements. Being able to express emergencies. Consequences of technical failures. Electrical failure during approach. Expressing a mandatory action. Hazard and error management

HTK4109 Airspace Organization (3-0-3) 5 ECTS

ATS Airspace. Airspace Strategy. ICAO and ECAC Airspace Classifications. Airspace Sectorization. Airspace Capacity. Turkish Airspace Organization. ATS Road Network, Establishment of ATS Road Network. RNAV Applications in Airspace. Turkish Airspace and Current ATS Environment. Flexible Use of Airspace. Flexible Airspace Structures. Airspace Management Levels. Airspace Use Plan. Free Route Airspace Concept

HTK4111 UAV Operation (3-0-3) 5 ECTS

Aircraft definition and UAV, Aviation Rules, Flight Dynamics and Basic Flight Principles, General Meteorology Information, Air Traffic Control (ATC) Procedures, Aviation Physiology, Flight Operation, UAV capabilities and tasks, Control Systems, System

components and design, Controllable Systems, Propulsion Systems, Avionic Systems, Control, Maintenance and Repair.

HTK4113 Autonomous Aircraft Safety (3-0-3) 5 ECTS

Introduction to autonomous aircraft: Definitions, classes and basic concepts. Integration of autonomous systems into airspace and air traffic management. Human factor and task sharing in autonomous flight. Analysis of autonomous aircraft risks from the perspective of air traffic controllers. Sense-and-avoid systems and collision avoidance technologies. Communication systems and data link security (C2 Link, cyber attacks). Reliability of navigation and positioning systems (GNSS, INS). Design of emergency scenarios and fail-safe structures. Automatic landing and rerouting systems. Multiple autonomous vehicle scenarios in terms of airspace management. Software validation, artificial intelligence algorithms and safety tests. Safety regulations of authorities such as SHGM, EASA, ICAO. Case studies: Safety incidents experienced in autonomous aircraft. Student project presentations and evaluations.

HTK4115 Aviation Accident Scene Investigation (3-0-3) 5

Aviation accidents and incidents: Definitions and conceptual framework. National and international accident investigation authorities (ICAO, NTSB, SHGM). Role and responsibilities of air traffic controllers in accident processes. Accident notification processes, emergency procedures and first response. Accident scene safety and preservation of evidence integrity. Analysis of radar and radio recordings. Flight data recorders (FDR/CVR) and audio analysis methods. Effect of human factors in accidents (fatigue, attention, communication). Flight scenario reconstruction techniques. Effects of meteorological factors on accidents. Accident report writing and standards (ICAO Annex 13). Determination of preventive measures and development of safety recommendations. Examination of actual cases (incident investigation studies). Student case analysis presentations and general evaluation

HTK4117 Civil-Military Air Traffic Coordination (3-0-3) 5

Airspace Users-General Air Traffic and Operational Air Traffic. Civil-Military Cooperation and Requirements for Improving Cooperation. Responsibilities of Civil-Military ATC units and

NATO structure, duties of ADIZ. Duties of Air Defense Notification Center (HSBM). Military Activities that May Endanger Civil Flights. Civil/Military cooperation in national and NATO exercises, VIP traffic, prohibited, restricted and dangerous areas, prevention of civil aircraft. Rules for entry, departure and transit passage of aircraft, flights within the scope of slots. Responsibilities of Civil/Military ATC units in emergency situations, Search and Rescue Regulation, border areas flight regulations, Air Military Forbidden Zones. Civil-Military Coordination Center (CMC) and rules of engagement. Flexible Airspace Use Concept. Flexible Airspace Structures and Procedures. Conditional Route Categories and Coordination Process. Operations of National Aircraft. Flexible Use of Forward Airspace.

HTK4102 Radar Area Control Simulation (4-4-6) 9 ECTS

Synthetic Airspace Introduction, traffic definition and traffic handover procedures. Receiving and vectoring techniques of handover landing/departure traffic. Introduction of entry/exit points of synthetic area to be used, MRVA values, prohibited/restricted/dangerous areas, area of responsibility and handover procedures. Provision of Air Traffic Control, Flight information and Alert services to IFR and VFR traffic. ATM: Level Allocations, Separations. ATM: TCAS, Aircraft with service priority. Effect of meteorological events on aircraft and flight times. Speed limiting applications used in area control for aircraft of different types and performances. Flight safety enhancing systems, ACAS, MTCA, STCA. Unexpected / emergency applications. Unexpected / emergency applications. Complex traffic applications.

HTK4104 Graduation Project (0-2-1) 2 ECTS

Determination of project names. Discussion of the project topic with the instructor. Statement of the purpose of the project. Preparation of the content of the project and preliminary report. Control of the purpose and content specified in the project. Project management (Planning, timing and cost analysis). Project management (Planning). Project management (Proposal). Project management (Time management). Project management (Cost). Implementation of the project work plan. Reporting of the achieved results. Delivery of the project with a final report.

HTK4106 English Speaking Skills VI (3-0-3) 4 ECTS

Radio speech communication situations. Examples that cause communication disorders. Airport signs. Airport ground vehicles. Communication errors: errors in understanding the pilots correctly. Runway incursion. Situational awareness. Phrasology and general English. Precursors of accident occurrence. Coping with incomprehensible speech. Environmental events. Communicativeness of weather conditions. Coping with abnormal situations in flight. Clarification and other expression of events.

HTK4108 Safety Management in Air Traffic System (3-0-3) 5 ECTS

Why is Safety Management System needed in Aviation? Concepts of Risk and Hazard. Concept of Safety in Aviation, Development of Safety Concept. Evaluation of Safety. Errors and Violations. Errors and Violations. Safety Culture. Reporting in Safety Management System. Basic Approaches in Safety Management System. Basic Conditions of Safety Management System. Preparation of Safety Management System Manual. Preparation of Safety Management System Manual. Case Studies in Safety Management System. Documentation of Case Studies.

HTK4110 Research Methods and Presentation Techniques (3-0-3) 5 ECTS

General View of Research Methods and Presentation Concepts. Definition, Types and Stages of Research. Determination of Research Subject and Definition of Problem. Literature Review. Hypothesis Generation. Determination of Research Sample. Measurement and scales in research. Data Definition and Data Collection Techniques. Analysis of Data. Reporting of Scientific Research. Ethics in Scientific Research. Determination of Presentation Content and Implementation of Presentation Design. Implementation of Presentation. Summarization and Feedback

HTK4112 Approaches in Air Traffic Management (3-0-3) 5 ECTS

Principles of the course, overview of course content. Brief history of aviation and air traffic control: history of flight, HTK evolution, establishment of ICAO, radar control period, HTK modernization. Historical development in air transportation. Airline deregulation, air rights, air transportation regimes. Airline networks; factors affecting network structure, airline collaborations. Innovations on the technological side; development of aircraft technologies and

their effects on HTY, high-speed aircraft. Very large-body aircraft concept and development. UAM (Urban Air Mobility) concept. Unmanned aerial vehicle traffic management. U-space concept. Drones, new aircraft configurations, commercial spaceflights. Changes in operational scale; current and future HTY paradigm, global air navigation plan. Modernization programs, SESAR, NEXTGEN. Review from an environmental perspective, environmental impacts of HTY, gas emissions, preventive studies.

HTK4114 Situational Awareness (3-0-3) 5 ECTS

Emotional intelligence and emotion management, the concept of emotion and classification of emotions, emotion theories. Emotion regulation, intelligence and types of intelligence, emotional labor, the relationship between emotional labor and burnout. Introduction to psychology, science of psychology. Human development, motivations and emotions, sensation and perception, Consciousness and states of consciousness, Cognition and mental abilities, Personality, conflict, coping with stress, Classification of sensations, attention and perception, factors affecting perception, perception deceptions. Mental health and illnesses, Situational awareness, levels of situational awareness, shared situational awareness, Situational awareness and HTK, Situational Awareness and decision-making mechanism, DECIDE model.

HTK4116 Introduction to Nanotechnology (3-0-3) 5 ECTS

What is nanotechnology. History of nanoscience, Concept of size and scale, Surface area interactions, Properties that change depending on size, Production of nanomaterials Production of nanomaterials. Characterization of nanomaterials, Nanostructures in nature, Application areas of nanotechnology in aviation.

HTK4118 Artificial Intelligence in Aviation (3-0-3) 5 ECTS

Introduction to artificial intelligence: Basic concepts and their relationship with aviation. Overview of artificial intelligence applications in air traffic management. Machine learning (ML) and supervised/unsupervised learning techniques. Big data and data preprocessing processes: Flight and radar data. Artificial intelligence in air traffic forecasting and capacity planning. Voice command recognition and natural language processing (NLP) techniques.

Command classification in ATC (Air Traffic Control) conversations. Anomaly detection and early warning systems for flight safety. Monitoring of airport operations with image processing. Autonomous decision support systems in taxi, approach and take-off phases. Airspace optimization and route recommendation algorithms. Ethical, legal and security aspects of artificial intelligence systems. Artificial intelligence-based simulation and training systems. Current applications and student project presentations.