

T.C.

ONDOKUZ MAYIS UNIVERSITY

FACULTY OF ENGINEERING-GEOMATICS ENGINEERING

UNDERGRADUATE PROGRAM COURSE CONTENTS (2019-2020)

(Senate Decision dated July 11 2019)

FIRST YEAR

1. SEMESTER (AUTUMN SEMESTER)

HRT 113 Land Surveying-I (1-2)2 (AKTS:6)

Basic Concepts, Map, Definition of Plan and Sketch, Angular Units and Transformation between them, Small Angles, Concept of Scale in Maps, Concept of Error, Error Account and Propagation of Error, Basic Measurement Methods, Computation of Area and Methods for Area Computation, Definition of Coordinate Systems, Small Point, Side Point, Polar, Intercept Point, Coordinate Transformation Calculations.

HRT 115 Geodesic Calculation (2-0)2 (AKTS:5)

General Information Related to Calculations, Unit of Measurements, Rounding of Numbers, Error Sources in Calculations, Calculations with Small Angles and Serler, Geometric Fundamental Information, Plane Trigonometry, Solutions of Plane Triangle, Fundamental Information Related to Circle, Solutions of Angular Square, Spherical Triangle, Solutions of Spherical Triangles, Neper Rule, Geographic Coordinates, Navigation

YDİ 111 Foreign Language (4-0)4 (AKTS:4)

Tenses, Conjunctions: The verb To Be, Possessive Adjectives and Pronouns, There is, There are, Some/ Any/ Much/ Many/ A lot of, Countable and Uncountable Nouns, Making Polite Requests, Comparative and Superlative Forms of Adjectives, Like/Would like

TBFİZ 113 Physics-I (3-0-2)4 (AKTS:6)

Vectors. Motion and Laws of Motion. Circular Motion and Other Applications of Newton's Rules. Work and Kinetic Energy. Potential Energy and Conservation of Energy. Linear Momentum and Collisions. Rotating a Solid Body around a Fixed Axis. Rolling Motion and Angular Momentum. Static Balance and Flexibility.

TBMAT 103 Mathematics-I (4-0)4 (AKTS:5)

Real and Complex Numbers. Introduction to Analytic Geometry. Cartesian Coordinate System. Functions and Their Graphics. Equations of Circle and Conic Sections. Translation of Axes Asymptote; Vectors in a Plane, Differentiation for Algebraic Functions. Derivative and Limit. Derivative Functions, Inverse and Implicit Functions. High Order Derivatives, Applications of Derivative. Ascending and Descending Functions. Extreme Values. Rolle's and The Mean Value Theorems. Extreme Value Applications. Trigonometric, Logarithmic and Exponential Functions and Their Derivatives.

TBKIM103 General Chemistry-I (3-0)3 (AKTS:4)

Fundamental Concepts and Stokiometry, Atomic Structre, Atom Theories and Periodic Table, Chemical Bonds, Molecular Geometry, Gases and Gas Theories, Liquids, Solids, Solutions and Their Properties. Thermochemistry, Chemical Kinetic, Chemical Equilibrium, Acids and Bases, Resolution.

FIRST YEAR

2. SEMESTER (SPRING SEMESTER)

HRT 114 Land Surveying-II (1-2)2 (AKTS:4)

Horizontal Control Points, Polygon Point Facilities, Measurements of Polygon Points, Polygon Point Calculations, Triangulation Point Facilities, Measurements of Triangulation Point, Front Azimuth, Side Azimuth, Back Azimuth, Division of Areas.

HRT 106 Probability and Statics (3-0)3 (AKTS:4)

The aim of Statics and Fundamental Concepts, Classification and Frequency Distribution, Arrangement of Distribution Tables, Sampling Distributions, Mean and Variance Calculation of Dataset, Distribution of Dataset, Skewness and Flatness Factors, Probability, Fundamental Concepts and Probability Calculations, Random Variable, The Probability Distribution Function, Hope Value and Variance, Probability Distributions, Test Distributions, Confidence Interval and Confidence Limits, Statistical Tests.

HRT 116 Introduction to Geomatic Engineering and Occupational Ethics (2-0)2 (AKTS:4)

The Short History of Geomatic Enginnering, Instution and Organization in which A Geomatic Engineer Works and The Function of The Profession, The Definition of Geoid. Basic Measurement Tools, Geodetic Measurement Tools, Concept of Scale. Types of Map and Information in Map. Large Scale Map and Map Information Generation Regulation. Concepts of Polygon, Triangulation and Levelling. Natural and Artifical Objects in Earth and Their Display on Map. Contours and Digital Terrain Model. Aspect and Slope Analysis. Fundamental Concepts related to Land Register, Cadastre and Reconstruction. Concepts of Ethics and Morals, Factors playing a role in Formation of Moral. Ethics Levels, Ethics Rules, Ethics Systems and Occupational Ethics. Ethical and Unethical Behaviours in Working Life and Professional Corruption and The Results of Unethical Behaviours in Working Life. Business Ethics and Social Responsibility.

HRT 110 Algorithms and Programming-I (1-2)2 (AKTS:4)

Historical Development of Visual Language, Fundamental Philosophy and Standarts, Compilers and Interpreters, Static and Dynamic Libraries, Static and Dynamic Link. Data Types, Data Structures, Data Types in VisualC# and The Definition of Data Types. Programme Control Statements. Visual C# Compiler. The Properties of Compilers and Using of It. Concept of Object. Concept of Private and Public. Member Variable and Member Functions. Structures, Definition and Running of Functions in C#. C# Forms and Controls, The Properties of These Objects. One and Two Dimensional Arrays. Pointers and Pointer

Arithmetic. Unsafe Memory Management, Matrix Algorithms. Introduction to Defining A Class. The Definitions of Constructor and Destructor.

TBFİZ114 Physics-II (3-0-2)4 (AKTS:6)

Optic, Electric Field, Gauss Law, Electric Potential, Capacity and Dielektric, Current and Resistance, Direct Current Circuits, Sources of Magnetic Field. Faraday Law, Self Inductance, Alternative Current Circuits.

TBMAT104 Mathematics-II (4-0)4 (AKTS:5)

Polar Coordinates. Series. Taylor-Maclaurin and Binomial Series; Definite and Indefinite Integrals, Arc Length, Area, Surface Area of Revolution, Sentroid, Applications related to Momentum Calculation. Vectors in Space, Differential of Vectors. Cylindrical and Spherical Coordinate Systems. Fourier Series. Limit in Functions with Many Variables. Continuity, Partial Derivative, Total Differential, Variable Transformations, Maximum and Minimum Values, Multiple Integrals. Area, Volume, Center of Gravity, Momentum of Inertia Calculations. Definition of Differential Equations.

ATİ 112 Principles of Atatürk and History of Revolution (4-0)4 (AKTS:5)

Turk Revolution and Revolution Movements: Qualities and Aims of Revolutions. Political Revolutions: The Establishment of People's Party. Izmir Assasination, Independence Tribunal, Revolutions in Education-Cultur: Law on Unity of Education, Letter Revolution, The Studies on History and Language. Social Revolutions: The Closure of Dervish Lodges and Shrines. The Surname Law, Revolutions in Calendar and Measurements. Turkish Foreign Policy: Lausanne and Montreux Treaties, Turkey-Europe Relations. The Basic Principles of The Turkish Revolutions: Repuclicanism, Nationalisim, Populism, Statism, Secularism, Revolutionism.

SECOND YEAR

3. SEMESTER (AUTUMN SEMESTER)

HRT 229 Fundamentals of Levelling (1-2)2 (AKTS:5)

Concept of Height. Height Types and Height Determination Methods. Geometric Levelling, Tools and Methods used. Precise Levelling. Trigometric Levelling. Sphericity and Refraction Effect. Geometric and Trigonometric Levelling Applications. Barometric Levelling. GPS Levelling. Takeometric Measure. Surface Levelling, Calculation and Drawing of Cross-Section and Long-Section Measurements. Volume Calculations.

HRT 203 Cartography (3-0)3 (AKTS:5)

Definition and Scope of Cartography, Concept of Map and Scale, Classifying of Maps. Shape and Size of Earth, Geoid, Reference Ellipsoid and Concept of Datum. Reference Surface Selection for Earth. Geographic Coordinate System, Spherical Polar Coordinate System, Orthodrome and Loxodrome on Sphere, Concept of Map Projection, Gaussian Curvature, Projection Surfaces and Concepts of Deformation, Fundamentals about Map Projection, Classification of Projection, Planar Projections, Cylindrical Projections, Concept of Reduction, Gauss-Kruger Projection, Reductions in Gauss-Kruger Projection, UTM

Projection, Conic Projections, Generalization, Modern Cartography, Cartographic Modulus of GIS Softwares.

HRT 205 Real Estate Law (3-0)3 (AKTS:4)

Concept of Law, Sources of Law, Parts of Law, Parts of Civil Law, Property Law based on Civil Law, Inheritance Law and Person Law, Concepts of Land Administration and Land Management, The Aims of Land Management and Legislation related to Land Management, Property and Concept of Ownership, Possession, Immovable Properties that need registration, Public Goods, Non-registered Areas, Ecrimisil, Concept of Coast and Coastal Line, Easement and its kinds, Land Registry and Elements of Land Registry, Proceedings made in Land Registry, Registry Proceedings, Condominium, The Floor Easement, Concepts and Applications of Timeshare, Foundations and Related Legislation, Forest, Mine and Coast Law and Related General Judgments, Property Acquisition of Foreigners and Related Legislation, Concepts related to Inheritance and Legal Regulations within Inheritance Law, Fundamental Principles related to Inheritance Distribution and Resolved Examples, Immovable Property Acquisition of Foreigners.

TDK 211 Turkish Language (4-0)4 (AKTS:4)

Elements of Sentence, Analysis and Application of Sentence, Literature and Reading and Analysis of Works related to Thought World and Rhetorical Practises, Written Composition Types and Practise, Expression and Sentence Errors and Their Corrections, The Rules that need to be obeyed for Preparation of Scientific Papers (Report, Article, Notification, et al.), Improving Disciple's correct and good speech and writing properties based on Sample Text selected from Turk and World Literatures and Thought History and Related Rhetorical Practises.

HRT 281 Linear Algebra (3-0)3 (AKTS:5)

Vectors and Their Definition, Properties of Vectors, Cartesian and Base Vectors, Scalar and Vectorial Mixed Double Vectorial Multiplication, Linear Independence. Matrices: Square, row, column matrices, Transpose Matrix, Symmetric and Antisymmetric Matrix. Zero, Unit, Diagonal, Scalar, Periodic, Idempotent, Involut, Nilpotent Matrices. Determinants and Their Properties. Sarrus Rule, Minor of One Element, Laplace Expansion. Cramer Theorem, Addition, Subtraction and Multiplication Proceedings in Matrices. Invers of a Square Matrix, Rank of a Matrix and Calculation of its invers. Linear Transformations. Characteristic Equation of A Matrix. Characteristic Values. Self Values, Eigenvalues, Eigenvectors. Forms of Matrix: Linear, Bilinear, Quadratic Forms. Vector Analysis. Space Analytical Geometry: Coordinate Systems. Plane, Line, Second Order Surface, Curvilinear Integral: Its Definition, Vectorial Expression, Properties. Green Formula. Surface Integral, Stokes and Diverjans Theorems.

HRT 219 Algorithms and Programming-II (1-2)2 (AKTS:4)

File Types. Properties of Files and Text Files. Binary Files. Management of Binary Files. Digital Image Formats. Opening of Image Files. Low Level Pixel Functions. Format Transformations in Digital Image. Database Files. Relational Database Management Functions. Interpretation of Basic CAD Algorithms by using databases and images. Using of

Libraries with Open Sourced Code with Visual C#. Ethernet Applications with C# and OpenCV Applications.

HRTSEC-1 Elective Course 1 (2-0)2 (AKTS:3)

HRT 221 Engineering Geology (SD1) (2-0)2 (AKTS:3)

Engineering Geology, Physical Properties of Objects forming Earth Crust, Major Minerals forming Masses. Classifying of Masses. Igneous Masses, Sedimentary Masses, Metamorphic Masses, Structures of Masses, Geological Change of Earth. Erosion, Tectonic Events on Earth. Earthquakes, Geological Maps.

HRT 223 Geodesic Astronomy (SD1) (2-0)2 (AKTS:3)

Fundamental Concepts in Geodesic Astronomy, Astronomical Coordinate Systems. Astronomical Triangle Solutions, Star Observations, Special Positions of Stars, Changes in Star Coordinates, Astronomical Almanacs, Concept of Time and Time Calculations, Azimuth, Determining Latitude and Longitude.

HRT 225 Matlab in Geodesy (SD1) (2-0)2 (AKTS:3)

Fundamental Concepts in Matlab Programming, File Structure, Functions, Traverse Calculation, Examples of Coordinate Transformations.

SECOND YEAR

4. SEMESTER (SPRING SEMESTER)

HRT 202 Numerical Analysis (3-0)3 (AKTS:4)

Numbers, Number Systems, Matrices, Basic Concepts, Inverse Matrix Calculation, Solutions of Linear and Nonlinear Equations, Direct and Indirect Iterative Solution of Nonlinear Equation Systems. Interpolation, Interpolation with Finite Difference Method. Numerical Derivative and Integral Calculation.

HRT 204 Cadastre (3-0)3 (AKTS:3)

Historical Development of Cadastre, The Structure of Land Registry Cadastre Institution. Former Measurement Units used in Cadastre and Information about Calendars. Land Ownership, Cadastre Law, Cadastre by Tender, The Role of Private Sector in Cadastre Works, Renovation Works, Maintenance Services and Alteration in Cadastre. Versatile Cadastre

HRT 222 Computer Aided Mapping Design (1-2)2 (AKTS:4)

Map Sheets, Drawing Tools, Map Drawing Applications with Measured and Calculated Values, Computer Aided Mapping Design (CAD), Advantages of CAD, Hardware for CAD, Storage Devices, Computer Networks, Graphical Output Devices, Manual, Semi-Automated and Full-Automated Digitizing, Feature Encoding, Raster Data Structures, Vector Data Structures, Comparing Raster-Vector Data Structures, Raster-Vector Conversions, Helmert,

Affine and Projective Transformations and Usage Principles, Spatial Data Interchange, Digital Elevation Models, Cartographic Production, National Widespread CAD Softwares, CAD Applications in Various CAD and GIS Softwares.

HRT 230 Field Practice (0-4)2 (AKTS:4)

Production of A Map with 1/1000 scale and contour of A certain size of Land, Establishment, Measurement and Calculation of Polygon, Drawing Works, Prismatic and Tacheometric Measurement.

İSG250 Occupational Health and Safety (4-0)4 (AKTS:4)

In the content made by the Council of YÖK.

HRT 282 Differential Equations (4-0)4 (AKTS:4)

Derivative under the Mark of Integral. Differential Equations: Equation Building, Solution Methods. First Order Differential Equations. Homogeneous that can be divided to its variables. Bernoulli, Riccati, Lagrange. Clairaut Differential Equations. Full Differential, Integral Factor. High Order Linear Differential Equations. Linear Dependence. Wronski Determinant. Linear Differential Equations with Constant Coefficient. Lagrange Method. Euler-Cauchy Equation. Second Order Differential Equations with Variant Coefficient. Laplace Transformation.

HRT 232 Urban and Regional Planning (2-0)2 (AKTS:3)

Concept of Sustainability, Fundamental Definition and Concepts of Country, Region and Urban Planning, Settlements System, Evolution of Settlements and Planning, Land Usage and Fundamental Principles of Planning. Urban Life Functions in Physical Planning, Process of Urban Planning and Scrutiny of Legal Bases in Turkey. Planning Hierarchy in Turkey and Planning Types. Region-Environment Order- Reconstruction Plans. Plan Making and The Approval Steps and Related Legislation. Urban Infrastructure, Urban Technique Infrastructure, Transportation Network Planning and Basic Principles, Properties of Transportation Systems, Intersections and Intersection Types. Parceling Principles and Solved Examples. Social-Economic Criterias in Parceling and Project Standarts, Measurement and Map Services and Their Function in Planning Process.

HRTSEC-2 Elective Course 2 (2-0)2 (AKTS:3)

HRT214 Quality Management and Standards (SD2) (2-0)2 (AKTS:3)

Production of Standard and Its Importance in Service Sector, Management Quality and Standards, Environment Standards, Quality Management System Modulus, Strategic Management, Participation in Management, Process Management System, Source Management System, Efqm Perfection Module

HRT216 Web Programming (SD2) (2-0)2 (AKTS:3)

Basic Concepts and Definitions in Web Programming, Application Protocols, http Protocol, Web Browsers and Basic Working Principles of Web Servers, Client-Server Architectures, 2

and 3 Storey Architectures, Server Side Program Improving with CGI, ASP, JSP and Java Servlet, Distributed Object Systems, Java RMI, CORBA, DCOM, Service Oriented Architecture and Web Services, Improving Distribute GIS Applications with Web Services.

HRT220 Urbanization and Environment (SD2) (2-0)2 (AKTS:3)

Urban and Rural Settlements, Urbanization and Urbanization Process, Properties of Urbanization, Reasons of Urbanization, Urbanization in Developed Countries, Urbanization in Undeveloped and Developing Countries, Urbanization in Turkey, Urbanization Policies, Urbanization Models, Urbanization Problems, Unplanned Urbanization and Environment, Sustainable Urban Planning, Environmental Approaches.

HRT228 Labor and Tax Law (SD2) (2-0)2 (AKTS:3)

Introduction to Law, Definition, Aims, Main Concepts and Sources of Labor Law; Definition, Elements, Properties, Types of Individual Employment Contract, Making Employment Contract Obligation, Abolishment and Results of Individual Employment Contract, Working and Rest Durations, Wage and Wage Types, Trade Union Definition, Establishment of Trade Unions, Structure, Activity and Membership Transactions of Trade Unions, Collective Employment Contract Concept, Legal Limits of Collective Employment Contract and Beneficiaries, Collective Labor Disagreements.

THIRD YEAR

5. SEMESTER (AUTUMN SEMESTER)

HRT321 Geodetic Surveying (2-2)3 (AKTS:5)

Establishment Principles and Available Station of Basic Geodetic Country Networks (Triangulation, Gravity, Levelling), Turkey National GPS Network, Turkey National Vertical Control Network, Expedition in Triangulation Networks. Point Plant, Measurements and Reduction made in Triangulation Networks. Detection of Lost Triangulation Point. Triangulation Calculation and Applications. Front Azimuth and Back Azimuth Applications.

HRT303 Adjustment Calculus-I (3-0)3 (AKTS:4)

Error and Correction Concepts. Sensitivity Criterias, Correlation, Error Propagation Theory, Weight. Mean Error of Unit Measurement. Topic, Main Principles and Types of Adjustment Calculus. The Least Squares Method. Direct Measurement Adjusment. Indirect Measurement Adjusment. The Selection of Unknowns, Building of Correction Equations. Normal Equations. Reduction of Normal Equations. The Mean Error of Unknowns. The Mean Error of Function of Unknowns. Reduction of Correction Equations. Station Adjustment.

HRT305 Geodesy-I (3-0)3 (AKTS:5)

Shape of Earth and Rotary Ellipsoid. Properties of Rotary Ellipsoid. Latitude Types on Ellipsoid. Curvature and Main Curvature Raidus in Ellipsoid. Length and Area Calculation in Ellipsoid. Geodetic Curvature and Geodetic Curve. Using of Sphere instead of Ellipsoid. Legendre and Additament Methods in Spherical Triangle Solutions. Spherical Coordinate Systems. Geodetic Calculations in Spherical Geodetic Orthogonal Coordinate System.

Transformations between Spherical Geodetic Orthogonal Coordinate and Geographic Coordinates. Geodetic Calculations in Spherical Geographic Coordinates.

HRT307 Photogrammetry-I (3-0)3 (AKTS:4)

Definition, Scope, History, Application Fields and Classifying of Photogrammetry. Projective and Perspective Projection Geometry. Interior and Exterior Orientation Elements of Camera and Images. Coordinate Systems in Photogrammetry. Collinearity and Coplanarity Correlates, Photogrammetric Cameras, its varieties and structure. Analogue and Digital Images. Projective Projection of Point, Line and Plane. Scale on Photos. Elimination of Errors due to Height Differences. Position and Height Sensitivity. Photo Shooting Planning.

HRT309 Design and Rearrangement of Urban Areas (2-2)3 (AKTS:5)

Topic and Tasks of Land Readjustment, Sustainable Land Management Concept, Local Governance and its Tasks, Revision of Base Maps, Plan Types, Environment-Region-Reconstruction Plans, Reconstruction Plans and their types. Reconstruction Legislation and Concepts of Reconstruction, Geomatic Engineers' Tasks in Preparation of Reconstruction Plans. Reconstruction Plan Implementation Methods. Expropriation, Lot-Land Regulations (LLD), Drawing of Regulation Boundary, Regulation Partnership Share Rate Calculation, Parceling and Distribution Proceedings. Preparation of a Sample LLD Project, Reclamation Reconstruction Plan 10-b/c Applications, Assesment of Alternative Parceling Projects, Urban Transformation, Condominium Applications. Coast Usage of Legislation, Geographic/Urban/Land Information Systems in Land Management.

HRT323 Engineering Mechanics (2-0)2 (AKTS:4)

General Principles, Force Vectors: Vector Operations, Balance of Particles: Balance of Coplanar Systems, Balance of 3D Systems, Resultant of Force System: Momentum, Force Pair Momentum, Resultant Force and Force Pair Momentum System: Balance of Solid Bodies: Equivalent Force Systems in Solid Bodies, Structural Analysis: Lattice Beam Systems, Frames and Machines, Internal Forces: Internal Forces in Structural Elements. Friction. Centroid and Gravity Center. Moment of Inertia. Virtual Work Method. Basic Definitions, Internal Force, External Force, Stretching, Safe Stretch and Safety Coefficient, Thermic Stretches, Thermic Stretches in Composite Rods, Effect of Eugene Weight to Deformation, Equal Strength Bars, Stretches occurring in compressed Vessel, Stretch Transformations with One-Two Axis, Mohr Ring, Prime Stretches, General Condition of Hooke Laws, Normal and Shear Stretches in Vertically Loaded Beams, Normal and Shear in Various Profile Sections, Importance of Shear Stretches in Section Determination, Torsion of Shafts, Columns Theory, Thick and Thin Columns, Compound Resistance Conditions.

HRTSEC-3 ELECTIVE COURSE 3 (2-0)2 (AKTS:3)

HRT311 Coordinate Systems (SD3) (2-0)2 (AKTS:3)

Coordinate Systems and Basic Concepts, Cartesian and Polar Coordinate Systems and Relations between them, Natural Coordinate Systems, Reference Coordinate Systems, Astronomical Coordinate Systems, Orbital Coordinate Systems, Transformations between 2D

and 3D Coordinate Systems, ED50, WGS84, ITRF Datums and Transformations between them.

HRT313 Digital Image Processing (SD3) (2-0)2 (AKTS:3)

Basis of Digital Image Processing, Structure of Digital Images, Imaging Techniques, Mathematical Expression of Digital Images, Image Transformations, Image Improvement Techniques, Image Restoration, Image Segmentation Techniques, Image Compression.

HRT315 Visual Programming (SD3) (2-0)2 (AKTS:3)

Software Quality Principles and Object Oriented Programming, Visual Programming Alternatives, Advantages of Visual Programming and Ease that It Enables. Algorithm Development, Software Development with Delphi and Visual Basic, Local and Global Variable Concepts, File Operations, Professional Software Development with Visual Programming.

HRT317 Forest Cadastre (SD3) (2-0)2 (AKTS:3)

Definition of Forest, Forest Legislation, Person and Organizations related to Forests. Deforestation Operations. Forest Cadastre Commissions, Relations of Cadastre Organization and Forest Organization. Common Studies, determination of Forests and Their Registry in Cadastre Works by tender.

HRT319 Engineering Survey in Water Structures (SD3) (2-0)2 (AKTS:3)

Water Structures and Irrigation Facilities. Geomatic Engineering Applications for Design and Construction of Water Structures. Design of Water Structures. Production of Digital Maps for Water Structure Projects. Production of Dam/Pond Body Location and Reservoir Maps. Dam/Pond Body Location Profile Measure. Excavation Slope-Slope Bottoms and Filling Application. Digital Map Production for Project of Spillway, Tunnel, Gallery, Canal et al. such as Facility Locations and Transportation Ways. Project Application. Excavation Operations and Measurement in Water Structure Project. Excavation-Filling Calculation. Tunnel-Gallery Excavations. Hydrographic Measurements and Bathymetric Map Production. Reclamation of Stream. Profile Measure in Stream Beds. Application of Reclamation Projects. Deformation Measurements.

3. CLASS

6. SEMESTER (SPRING PERIOD)

HRT 338 Satellite Geodesy (1-2) 2 (ECTS:4)

Definition and application areas of satellite geodesy, Global positioning theory, positioning systems used in satellite geodesy, Transit, ArgosGeostar, Navstar, GPS, Glonass, Galileo. Signal structure, types of observations, code and carrier wave phase observations, differences of observations, sources of error in global position determination, mathematical models used, methods used in global position determination.

HRT 304 Adjustment II (3-0) 3 (ECTS:4)

Point Adjustment. Adjustment by indirect measures method, Computation of elements of error ellipse, Adjustment of trigonometric leveling and traverse. Unforced and free adjustment

of geodetic networks, balanced coordinate transformations, similarity, affine and projective transformations, elimination of discordant points, three-dimensional coordinate transformations, distributions, hypothesis testing and examination of adjustment results, testing the model hypothesis of adjustment, testing the significance of adjustment unknowns.

HRT 306 Geodesy II (3-0) 3 (ECTS:4)

General definition and concepts of projection. Projection of the sphere to the plane that preserves the ordinate. Geodetic calculations on the sphere surface according to plane principles with reductions, Gauss-Krüger conform projection of plane on the sphere. Transformations between Soldner and geographic coordinates to Gauss-Krüger coordinates. Ellipsoid geometry, reduction of dimensions to the ellipsoid surface, geodetic calculations on the ellipsoid surface, transformations between ellipsoidal geographic coordinates and geodetic coordinates, Layout Segmentation According to Geographical Coordinates, Sheet Corner Coordinates, Isometric parameters, Basic conditions of conform projection, Cauchy – Riemann differential equations, reductions and Essential coordinates computations in Gauss-Krüger projection of ellipsoid to plane, UTM Projections, slice transformation in Gauss-Krüger projection.

HRT 308 Photogrammetry II (3-0) 3 (ECTS:4)

Adjustment in photogrammetry, bundle adjustment types, block adjustment, photogrammetric triangulation, three-dimensional imaging with stereo images, mutual and absolute orientation, parallax concepts, camera calibration with additional parameters, orthophoto and photomosaic production, techniques for automatic measurement of image coordinates.

HRT 308 Database Design (2-1) 3 (ECTS:5)

Database Management Systems (DBMS), Basic Concepts and Definitions, DBMS Application Areas, DBMS Functions, Data Model, Database Diagram, Data Independence, Database Design, Database Design with Entity-Relationship Data Model, Database Design with Relational Model, MS Access DBMS Software Introduction, Database Design with MS Access, Forms and Macros in MS Access Software, Relational Algebra and SQL, Development of Application Programs in Visual Basic Programming Language.

MUH302 Entrepreneurship and Innovation (2-0) 2 (ECTS:5)

Entrepreneur. Entrepreneurship. Basic concepts of entrepreneurship. Fundamentals of entrepreneurial thinking. Testing the entrepreneurial personality. Entrepreneurship process. Business idea of Development and creativity. Creative problem solving techniques. Innovation. Business plan concept and business plan elements (market research). Market research using primary and secondary sources. determination of customers. current and future needs of customers. Business plan concept and business plan elements (marketing plan). Examination of the marketing mix within the marketing plan (product, price, distribution, promotion). Business plan concept and business plan elements (production (manufacturing/service) plan). Planning production. The concept of business plan and business plan elements (management plan). The adaptation of the management to the business plan by considering the functions. Human Resources Management. Business plan concept and

business plan elements (financial plan). Finding financial resources. planning the investment. preparation of financial statements and financial management elements. Accounting. Workshop for market research and marketing plan. Workshop for production (manufacturing/service) plan. Workshop for the management plan. Workshop on financial plan. Writing business plan and presentation.

HRT 350 Internship **(0-0) 0**
(ECTS:10)

Students intern for 30 working days in order to increase their professional experience and improve themselves in Public Institutions and Organizations or Private Sector.

HRTSEC-4 ELECTIVE LESSON **4** **(2-0) 2**
(ECTS:3)

HRT 340 Design of Geodetic Networks (SD4) **(2-0) 2** **(ECTS:3)**

Types of geodetic networks. Establishment principles and evaluation models. Sensitivity and trust measures in geodetic networks. Design and optimization concepts. Optimization of geodetic networks. Objective functions and design matrix. Optimization according to design parameters. Optimization according to the objective function.

HRT 342 Expropriation Technique (SD4) **(2-0) 2**
(ECTS:3)

Development of the expropriation in Turkey from the past to present. Expropriation legislation and practices in various countries. Expropriation legislation in Turkey. Relationship between expropriation and zoning practice. Development of Expropriation and Zoning Law. Expropriation principles. Expropriation methods. Valuation principles in expropriation. Expropriation cases. Return from expropriation. Examination of sample expropriation projects. Interpretation of expropriation applications in Turkey.

HRT 344 Computer Vision (SD4) **(2-0) 2** **(ECTS:3)**

Definition, history and development process of artificial intelligence. Artificial intelligence approaches. Artificial neural networks. Genetic algorithms. Genetic algorithms and optimization techniques. Genetic programming. Fuzzy systems. Expert systems. Artificial intelligence in the future. Vision, visual target tracking, target marking, detailing with Computer. Image matching concept. Image matching methods.

HRT 346 Physical Geodesy (SD4) **(2-0) 2** **(ECTS:3)**

Gravity and its potential. Orthogonality and sum theorem in spherical functions. Edge value problems. Centrifugal force and its potential. Nivo surfaces and plumb curves. Height anomaly and plumb deviation. Stokes formula. Vening and Meinesz formulas. Topographic isostatic reduction of plumb divergence. Three dimensional geodesy. Reduction of dimensions. Height systems. Placement and routing methods of triangulation networks.

4. CLASS

7. SEMESTER (AUTUMN PERIOD)

HRT 401 Geographical Information Systems (3-0) 3 (ECTS:5)

Geographic Information Systems (GIS) Basic Concepts and Definitions. GIS Applications. Differences between GIS and CAD. DBMS and GIS Functions. GIS Architectures. Topology. The Importance of Topology in GIS. Basic Topological Properties. Topological Data Structures. Graph Theory. Neighborhood and Occurrence Matrices. Popular Topological Data Structures. DIME, CARIS, ArcInfo Topological Data Structures. Creating Topological Data Structure and Topological Errors. Properties of Spatial Data. Spatial Data Structures. Raster Data Structures. Vector Data Structures. Spatial Data Collection Methods. Data Quality. Standards. Applications with Various GIS Software.

HRT 403 Application (2-1) 3

(ECTS:6)

Point application. Application of lines and angles. Parcel application. Horizontal and vertical application. Curves, curves calculations and curves application. Transition curves (clothoid, lemniscate etc.). Application of transition curves. Vertical curves and application of vertical curves.

HRT 405 Real Estate Valuation (3-0) 3 (ECTS:4)

Introduction about Real estate, value, valuation, real estate development and land management. Valuation legislation and methods. Factor selection and unit value calculation in land and land evaluation. Land expertise. Valuation in privatization. Valuation in urban transformation. Property ownership legislation and its implementation. Determination and updating of land value indices. Occupancy Fees and easement fee calculation. An example of land valuation with the precedent method. An example of agricultural land valuation with the income method. Capitalization interest rate account. Determining the building value and depreciation with the cost method. Nominal valuation method and sample application. Institutional arrangements. Production and interpretation of value maps. Calculation of Occupancy Fees and easement fee. Principles of preparing a Valuation Report and preparing a sample report.

HRT 407 Remote Sensing (3-0) 3 (ECTS:4)

General concepts and fundamentals in remote sensing. Electromagnetic Spectrum. Sensors used in Remote Sensing. Physical operating principles of sensors. Sources of errors in satellite images and their correction. Radar images. Combining sensor data. Rectification of satellite images. Classification of images. Map production and usage areas with remote sensing data. Best practices from around the world and our country.

HRT 409 Seminar (0-2) 1 (ECTS:3)

Scientific research techniques and Scientific study process steps. Publication scanning methods. Basic rules for making references and citation. Preliminary research and determination of topics for seminar. Researching the topics and preparing the content. Sharing the documents obtained by researching the subjects. Detailed examination of the topics. Writing the topic of the seminar. Presentation of the students to the responsible lecturer and other students.

HRT 441 Road Information **(1-2) 2**
(ECTS:5)

Historical development of roads in the world and in our country. Classification of roads. Terms related to roads. Geometric elements of roads. Horizontal and vertical curves. Definitions and calculations about transition curves. Survey and study methods. Study map. The horizontal and vertical position of the roads. Projecting section geometries. Cubage calculation and Brückner. Art structures and project principles. Road superstructure and design. Application of road projects. Excavation and filling operations. Sample road project application.

HRTSEC-5 ELECTIVE LESSON **5** **(2-0) 2**
(ECTS:3)

HRT 411 History of Science (SD5) **(2-0) 2** **(ECTS:3)**

Philosophy of science. Platonism. Rationalism. Phenomenology. Existentialism. Dialectical Materialism. Determinism. Constructivism. Conceptualization and modeling of physical reality. History of geodesy. Chronological developments. Important points in the history of geodesy. Institutions related to cartography. The development of cartography education. Application areas of cartography. Cartographers and cartography studies from past to present. Famous cartographers.

HRT 413 Conditional Measures Adjustment (SD5) **(2-0) 2**
(ECTS:3)

Conditional measures adjustment. Correction equations. Normal equations. Construction and reduction controls of normal equations. Precision calculations in conditional measures adjustment. Number of condition equations in geodetic network adjustment. Internal conditions, External conditions. Triangulation and leveling networks adjustment according to conditional measures method.

HRT 415 Radiometry (SD5) **(2-0) 2**
(ECTS:3)

Basic concepts and definitions of satellite images. Mathematical model of satellite images. Satellite images acquisition. Rational polynomials. Geometric relations between image and terrain. Geometric and radiometric precision concepts. Scope of application. Examples. Advantages and disadvantages of existing methods

HRT 419 Coastal Management (SD5) (2-0) 2 (ECTS:3)

Sustainability concept. Definition of Coastal Areas. General concepts in Coastal Management and planning. Development of coastal legislation in our country. Legal bases related to coasts. Coastal Areas Management. Public Benefit in the Use of Coastal Areas. Planning Coastal Areas. Coastal Planning and new initiatives in Turkey. Problems in the Management of Coastal Areas. Photogrammetry in the Management of Coastal Areas. Remote Sensing and GIS Usage. The concept of marine cadastre, its content and examples in developed countries. Seminar Presentation of Students. General evaluation.

HRT 421 Infrastructure Cadastre (SD5) (2-0) 2 (ECTS:3)

The situation created by adding the 3rd dimension to the 2D cadastral studies. The importance of infrastructure cadastre. Underground and aboveground facilities subject to registration. Determination of infrastructure and superstructure facilities in the cadastre and registration of property rights. Important studies that will set an example for the infrastructure cadastre.

HRT 431 GNSS Networks (SD5) (2-0) 2 (ECTS:3)

Basic concepts of GPS. Measurement and evaluation techniques in GPS. Static and kinematic measurement. Triangulation network coordinate calculation with static measurement. Point coordinate calculation with kinematic measurement.

HRT 433 Disaster Management (SD5) (2-0) 2 (ECTS:3)

Introduction to Disaster and Disaster Management. Classification of disasters. Disaster laws from past to present. Prime Ministry Disaster and Emergency Management No. 5902. Examination of the Law on the Organization and Duties of the Presidency. Disaster management systems. Modern disaster management system. Integrated disaster management system. Emergency management. What is risk management? What is crisis management? Institutions and organizations responsible for disaster management in Turkey, their duties and responsibilities. Disaster meaning and disaster management systems in some developed countries. Loss reduction and studies in order to reduce disaster losses in Turkey. Financial aspects of disaster management and disaster budget planning. Issues of disaster management and education in Turkey and the world.

HRT 435 Data Mining (SD5) (2-0) 2 (ECTS:3)

Introduction and General Definitions. Application Areas of Data Mining. Introducing about ready-made programs used in Data Mining. Data Mining in Spreadsheet Programs. Preparation of data for analysis (steps). OLAP. Classification and Clustering. Decision Trees. Statistics in Data Mining. Artificial Intelligence in Data Mining. Artificial Neural Networks in Data Mining. Association Rules. Other mining techniques in Data Mining. Web and Text Mining.

HRT 437 Unmanned Aerial Vehicles and Application Areas (SD5) (2-0) 2
(ECTS:3)

Unmanned Aerial Vehicles (UAV) and their types, technical features and usage areas. Use of UAVs in cartography and manufactured products. Pre-flight field operations and flight mission planning. Capturing, transferring and preprocessing steps. Point cloud and Digital Surface Model production. Ortho-photo production with UAV. Filtering of ground and above ground points for Digital Land Model production. Vectorial base map production using the produced SAM. Sample cartography applications with UAV.

HRT 439 Industrial Measurements (SD5) (2-0) 2 (ECTS:3)

Principle and Importance of Geodetic Measurements in Industrial Measurements. Instruments and Equipment Used in Industrial Measurements. Precise Angle Measurements and Length Measurements. Intake with Laser technique and control procedures. Sources of Error in Industrial Measurements. Industrial Measurement Methodology. Coordinate Systems and Coordinate Types (Perpendicular, Cylindrical, Spherical, etc.). Coordinate Transformations. Data Quality. The Place and Importance of Geodetic Measurement Techniques in Quality Control. Industrial Measurements by Geodetic Methods in Large Buildings, Special Constructions and Ship Construction Sector. Industrial Measurements by Geodetic Methods in Automotive Sector.

4. CLASS

8. SEMESTER (SPRING PERIOD)

HRT 402 Digital Photogrammetry (2-0) 2
(ECTS:5)

Definition of Digital Photogrammetry. Data Processing Methods and Application Areas in Digital Photogrammetry. Mathematical Model of Digital Photogrammetry. Photogrammetric triangulation. Image Correlation. Automation in Digital Photogrammetry. Digital Display Systems. Image processing. LIDAR, IFSAR. Application with Digital Photogrammetry Software.

HRT 404 Geographical Information Systems Applications (1-2) 2
(ECTS:6)

Spatial Analysis in Geographic Information Systems. Analysis of Details in the same or different Detail Class. Topological Overlap Analysis. Location Analysis. Network Analysis. Digital Height Analysis. GIS Based Multi-Criteria Decision Analysis (MCA). Address Coding. WebCBS Technology and Standards. WebCBS Applications. Temporal GIS. Data Models Used in Temporal GIS. Spatial Analysis Applications in ArcGIS and MapInfo GIS Software.

HRT 406 Graduation Project (0-4) 2
(ECTS:10)

This study is an independent study aimed at solving a professional problem. In the study, there are field measurements, laboratory measurements, calculations and evaluations, drawing works, computer-based studies. The work is compiled in the form of a report. Design and application work is done in any of the departments. *This course can be opened in the AUTUMN Semester for the students of the 9th and higher semesters.

HRT 408 Design and Arrangement of Rural Areas (2-1) 3
(ECTS:6)

Agriculture and agricultural production concepts. Factors affecting agricultural production. The presence of Turkey's soil and water resources. Farms and farm properties in Turkey. The fragmentation of agricultural land and its effects on business. Land degradation in Turkey. General information about land consolidation. Land Consolidation in Developed Countries. Legal bases of Land Consolidation. The stages of land consolidation. Determination of soil, fertility, location indices. Calculation of parcel indices. Creation of ranking maps. Block design. Planning the road and water network. Calculation of Participation Share for Common Facilities. Parceling and distribution operations. Sample Project Preparation: Preparation of a consolidation project. Evaluation of project teamwork within itself.

HRT 502 Professional Practice Program (0-24) 12 (ECTS:30)

Elected student in accordance to the Professional Practice Program Directive, the student will be considered EXEMPT from all courses of the 8th Term.

HRTSEÇ-6 ELECTIVE LESSON 6 (2-0) 2
(ECTS:3)

HRT 416 Project Planning (SD6) (2-0) 2 (ECTS:3)

Basic concepts of Project Planning. Major Operations Research Methods. Description of Project and Project Planning. Project Planning Method with Gantt Diagram. Network Diagram. Preparation Project by Network Diagram. Determination of Critical Activities and Abundances in Projects. Duration, Cost, Capacity Relations in Projects and Shortening the Critical Path. CPM-PERT Method. Factors Affecting Project Planning in Cartography. Project management. Calculation of Project Costs. Making Map Projects Through Tender.

HRT 418 Real Estate Acquisition by Foreigners (SD6) (2-0) 2 (ECTS:3)

Definition and Importance of Land as Real Estate. Stranger Concept. The principle of reciprocity. Real estate acquisition in the European Union (EU) member and candidate countries. Limitations. Examination of the legislation on the subject. Review in terms of urban and agricultural areas.

HRT 420 Spatial Computing (SD6) (2-0) 2
(ECTS:3)

Concept of Spatial and Spatial Informatics. Scope and Stakeholders of Spatial Computing. Spatial Data and Users. Inspire Directives. 2014 Cadastre Directives. Spatial Data Generating Institutions in Our Country. Studies of the Land Registry and Cadastre Organization. E-Government Concept and Applications from the World. Spatial data sharing within the scope of e-government. interoperability. Current Applications. Navigation Systems. 3D map production and presentation. Web GIS.

HRT 422 Analysis of Satellite Images (SD6) (2-0) 2 (ECTS:3)

Satellite images. Types of images. Principles of classifying satellite images. Trained and untrained classification techniques. Histogram-based classification. Sequential classification. Iterative self-classification (ISODATA). Minimum distance classification. Parallelogram classifier. Classification techniques according to maximum likelihood criteria.

HRT 426 Spatial Data Infrastructures (SD6) (2-0) 2 (ECTS:3)

National Spatial Data Infrastructure (NSDI). Basic Concepts and Definitions. Importance of NSDI. NSDI and e-Government. NSDI Benefits. NSDI Studies in the World. Situation in Turkey. International Organizations and Standards Bodies. ISO / TC 211. INSPIRE. Open GIS Consortium and W3C Consortium. NSDI Technology and Standards. Current State and Future Trends in Technology

HRT 428 Engineering Economics (SD6) (2-0) 2 (ECTS:3)

General economic definitions. Cost and Income concepts. Time value of money. Cash flows and interest accounts. Present value analysis. Annual cash flow analysis. Repayment rate analysis. Analysis of investment differences and continuous investment increases. Profit-Cost ratio analysis. Depreciation methods and applications. Economic efficiency measurements. Income, corporate and value added taxes, inflation and deflation. Engineering economics analysis in cases of tax payment and inflation. Examining the effects of re-evaluation and re-evaluation on engineering economics. Feasibility analysis.

HRT 432 Statistical Analysis of Geodetic Data (SD6) (2-0) 2 (ECTS:3)

Statistical data distributions. Establishing the mathematical model. Functional and stochastic models. Model hypothesis test. Mismatched dimensions test. Redundanz matrix. Sensitivity and reliability criteria. Test of significance of adjustment results.

HRT 434 Urban Transformation (SD6) (2-0) 2 (ECTS:3)

The concept of urban transformation. Urban Transformation Types. Components of Urban Transformation. Legal bases of Urban Transformation. Urban Transformation in terms of legal and technical aspects. Evaluation of the physical and environmental appearance of the areas subject to transformation. Principles of determining project areas and preparing new zoning plans. Determination of real estates in urban transformation areas. Land assessment.

Land Arrangement. Project costs. Finances and revenues. Transfer operations. Interpretation and Investigation of sample Urban Transformation Project was carried out in Turkey and the world. Application Stages of Urban Transformation Projects. Valuation Based Urban Transformation Applications.

HRT 436 Professional English (SD6)

(2-0) 2

(ECTS:3)

English in technical articles and presentations. Correspondence techniques on official technical issues. Technical terms and concepts in Measurement Knowledge. Using them in scientific English texts. Technical terms and concepts in Cartography, Theoretical Geodesy and Adjustment. Using them in scientific English texts. Technical terms and concepts in Photogrammetry, Remote Sensing. Using them in scientific English texts. Technical terms and concepts in Geographical Information Systems, Public Surveys and Cadastre. Using them in scientific English texts. Technical terms and concepts in mathematics, physics and statistics. Using them in scientific English texts. Preparation and discussion of the abstracts in English of the texts read.

HRT 438 Hydrology (SD6)

(2-0) 2

(ECTS:3)

Definition and scope of hydrology. Hydrological studies and their importance. Water resources on earth. Hydrological cycle. The concept of "system" and basic equations. Occurrence of precipitation, measurement of precipitation, analysis of rains records, rainfall intensity. Hietograph. Homogenization of rains data. Calculation of average rains height. Rains height-area-duration analysis. Rains intensity-duration relationship. Mechanism of evaporation. Evaporation from water, ground and snow surface. Measurement of evaporation. Reduction of evaporation amount. Evapotranspiration losses. Calculation of potential and actual evapotranspiration. Leakage capacity, infiltration rate, infiltration indices. Subterranean water regions. Groundwater flow. Hydraulic gradient. Hydraulic conductivity. Dupuit. Hypotheses of groundwater withdrawal by wells. Hydraulic calculation of wells. Well drilled in a free surface aquifer. Well drilled in a pressurized aquifer. Flow measurements. Flow rate definition. Level and water face slope measurements. Velocity measurements. Cross-section measurements. Flow measurements. Switch curve. Flow. Analysis of records. Flow rate and flow line. Flow rate continuity line and total flow. Properties of river basins. Segmentation of flow. Rains flow relations. Elements of the hydrograph. Examining the river basin as a system. Unit hydrograph theory. Obtaining the unit hydrograph. Unit hydrographs of different duration. Synthetic unit hydrographs. Flood calculations and the use of statistics in Hydrology.

HRT 440 Engineering Measurements (SD6)

(2-0) 2

(ECTS:3)

Mining measurements basic concepts. Underground point facilities. Tools used in underground measurements. Underground polygons and underground triangulation. Basic concepts of Hydrographic measurements. Vertical control datum. Maregraph measurements. Depth measurements. Creation of hydrographic maps. Equipment used in hydrographic measurements. Engineering projects and topographical engineering services.