

T.R.
MUNZUR UNIVERSITY
GRADUATE EDUCATION INSTITUTE DEPARTMENT OF CHEMICAL TECHNOLOGIES
MASTER'S DEGREE PROGRAM WITH THESIS COURSE LIST

COURSE							
Code	Name	T	P	L	Credit	ECTS	C/E
DIJ111	Digital Literacy	2	0	0	2	3	C
GON111	Volunteering Activities	1	2	0	2	4	E
KT5001	Specialty Field Course	6	0	0	0	10	C
KT5002	Master Seminar	0	2	0	0	5	C
KT5003	Master Thesis	0	1	0	0	20	C
KT5004	Inorganic Reaction Mechanism	3	0	0	3	5	E
KT5005	Inorganic Electronic Spectroscopy	3	0	0	3	5	E
KT5006	Organometals Chemistry	3	0	0	3	5	E
KT5007	Advanced Coordination Chemistry	3	0	0	3	5	E
KT5008	Inorganic Polymers	3	0	0	3	5	E
KT5009	Foundations Of Advanced Analytical Chemistry I	3	0	0	3	5	E
KT5010	Foundations Of Advanced Analytical Chemistry II	3	0	0	3	5	E
KT5011	Electrochemistry	3	0	0	3	5	E
KT5012	Selected Topics In Physical Chemistry	3	0	0	3	5	E
KT5013	Advanced Polymer Chemistry II	3	0	0	3	5	E
KT5014	Polymeric Composites And Characterization	3	0	0	3	5	E
KT5015	Advanced Polymer Chemistry I	3	0	0	3	5	E
KT5016	Polymer Technology I	3	0	0	3	5	E
KT5017	Polymer Technology II	3	0	0	3	5	E
KT5018	Thermal Analysis Methods	3	0	0	3	5	E
KT5019	New And Renewable Energy Sources	3	0	0	3	5	E
KT5020	Numerical Analysis And Computer Applications	3	0	0	3	5	E
KT5021	Drying Technology	3	0	0	3	5	E
KT5022	Advanced Electrochemistry	3	0	0	3	5	E
KT5023	Electrochemical Sensors	3	0	0	3	5	E
KT5024	Thin Film Coating Techniques	3	0	0	3	5	E
KT5025	Polymers Degradation	3	0	0	3	5	E
KT5026	Biopolymer	3	0	0	3	5	E
KT5027	Food Packaging	3	0	0	3	5	E
KT5028	Nano-Synthesis And Characterization	3	0	0	3	5	E
KT5029	Green Chemistry And Sustainability	3	0	0	3	5	E
KT5030	Nanoscience And Nanotechnology	3	0	0	3	5	E
KT5031	Nanotechnology And Application Areas	3	0	0	3	5	E
KT5032	Intellectual And Industrial Property Rights	2	0	0	2	3	E
KT5033	Entrepreneurship	2	0	0	2	3	E
KT5034	Project Management	2	0	0	2	3	E
KT5035	Scientific Research And Publication Ethic	3	0	0	3	5	C
KT5036	Advanced Kinetic	3	0	0	3	5	E
KT5037	Colloid Chemistry	3	0	0	3	5	E
KT5038	Antimicrobial Polymers	3	0	0	3	5	E
KT5039	Conductive Polymers	3	0	0	3	5	E
KT5040	Polymer Production And Processing	3	0	0	3	5	E
KT5041	Advanced Spectroscopic Methods	3	0	0	3	5	E
KT5042	Basic Laboratory Principles and Methods	3	0	0	3	5	E
KT5043	Special Computer Applications in Chemistry	3	0	0	3	5	E

C: Compulsory / E: Elective, T: Theoretical, P: Practical, L: Laboratory

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THESIS MASTER'S DEGREE PROGRAM COURSE CONTENTS

DIJ 111 DIGITAL LITERACY

To increase students' knowledge and application abilities on the subjects of Internet Technologies, Portable Technologies, Social Networks, Information Ethics, Technology and Lifelong, Learning, Cloud Computing, Technology, Society and Human and Future Technologies. Internet Technologies, Portable Technologies, Social Networks, Technology, Society and Human, Information Ethics, Technology and Lifelong Learning, Cloud Computing, Future Technologies.

GON111 VOLUNTEERING ACTIVITIES

Management and Organization Concepts, Volunteering concept and volunteer management, Basic Volunteering, Participation in Voluntary Work in Public Institutions, Local Governments and Non-Governmental Organizations, Basic areas of volunteering (Afad, Environment, Education, Culture, Sports, Health, Social Services), Community service practices importance, identifying current problems of society and producing projects to find solutions, social responsibility, communication and communication processes

KT5001 SPECIALTY FIELD COURSE

Determining an academically consistent research question that is worth examining, Proposing a critical approach to the research topic, Identifying the literature in the relevant field, Preparing a thesis proposal, Creating a thesis content draft, Preparing a timeline, Developing data collection tools appropriate to the problem, Collecting and analysing data , Interpreting the findings, Drawing conclusions from the research findings, Making suggestions based on the research results, Reporting the research results, Checking the compliance of the research with scientific principles, Writing the research as a thesis/project.

KT5002 MASTER SEMINAR

Determining the topic for the master's seminar study, Selection of the subject to be studied, Literature review, Listing the literature studies on the subject, Determining the method on the subject, Applying the preliminary preparations according to the determined method, Putting the study into practice, Master's seminar study, Interpreting and presenting the results of the master's seminar study.

KT5003 MASTER THESIS

Master's thesis work

KT5004 INORGANIC REACTION MECHANISM

Chemical kinetics: Rate laws, integrated rate equations, Activation parameters, Basic concepts, Stability and inertness, Kinetic techniques, Classification of mechanisms, Kinetic results of reaction pathways, Substitution Reactions in Square Planar Complexes, Substitution Reactions in Tetrahedral Complexes, Substitution reactions in octahedral complexes, Chelate and ligand effects, Metal Effect, Acid and Base Catalysis, Stereochemistry of Octahedral Substitution reactions, Organometallic Substitution Reactions, Synthesis of coordination compounds using substitution reactions, Thermodynamic stability of coordination compounds

KT5005 INORGANIC ELECTRONIC SPECTROSCOPY

Absorption of light and Beer-Lambert law, Quantum numbers of multi-electron atoms, Spin-orbit coupling and term symbols, Electronic transitions in molecules and selection rules, Tanabe-Sugana diagrams and d^2 - d^8 electron configurations, Jahn-Teller decay and spectra (d^1 and d^9 electron configurations), Splitting of terms in the crystal field, Orgel diagrams and $10 Dq$, examples of using Tanabe-Sugana diagrams, Determination of Δ_o from spectra, Charge transfer bands, Interpretation of electronic spectra of complexes

KT5006 ORGANOMETALS CHEMISTRY

General properties, history and recent developments of organometallic compounds, Organic ligands and their naming, Electron rule (electron counting), 18 electron rule, square plane complexes, Ligands, Organometallic compounds of transition elements, naming of organometallic compounds, Bonding between metal atoms and organic π systems, Synthesis and reactions of organometallic compounds, Reactions in which ligands transform into a new structure, Organometallic catalysts

KT5007 ADVANCED COORDINATION CHEMISTRY

Definition of coordination compound, examples in life and industry, Werner Theory, Nomenclature of coordination compounds, Isomerism, Coordination numbers and structures, VSEPR theory, Coordinative bonds; Molecular Orbital theory, Valence bond theory, Crystal-field theory, Ligand-field theory, Ligand types and properties, Usage areas of coordination compounds

KT5008 INORGANIC POLYMERS

Definition of inorganic polymers and their differences from other polymers, Synthesis methods, Classification according to their bonding types, Supramolecular isomerism, Building blocks, Guest-host structures, Complementary anions, Intramolecular and intermolecular interactions, Transition metal inorganic polymers, Ligands and their types, Areas of use of inorganic polymers in industry

KT5009 FOUNDATIONS OF ADVANCED ANALYTICAL CHEMISTRY I

Introduction to chemical analysis, Errors in chemical analysis, Random errors in analysis, Application of statistics in examining and evaluating data, Solutions and solution concentrations, Chemical equilibrium, equilibrium constant, systematic solution in equilibrium systems, Strong acids and bases and titration curves, Buffer solutions, Complex acid-base systems and titration curves, Buffer solutions obtained from complex acid-base systems

KT5010 FOUNDATIONS OF ADVANCED ANALYTICAL CHEMISTRY II

Aqueous solutions and chemical equilibrium, Effect of electrolytes on solubility balances, Solution of solubility balance problems and solubility calculations in complex systems, Solubility of precipitates in the presence of complexing reagents, Gravimetric analysis methods, Precipitation titrimetry, Complexation titrations, Structure and properties of EDTA, Indicators for EDTA, EDTA titration methods, Introduction to electrochemistry, Applications of standard potentials, Electrode potentials in redox titrations, Applications of redox titrations

KT5011 ELECTROCHEMISTRY

What is electrochemistry? What are cell types? Cell Potential determination, Anode-Cathode potentials, liquid contact potential, Intracellular resistance decrease, Polarization effects, What are the electrode types? Standard Hydrogen, Calomel and Ag/AgCl reference electrodes, Working electrodes: Metal, membrane (glass, liquid and solid state) electrodes, pH electrodes, Potentiometric Method: Direct and titration technique, Conductometric Method, Electro gravimetric Method, Introduction to Voltammetric Methods, Polarography, development and types, mathematical modeling and qualitative-quantitative applications of polarography, Amperometric Titration, Chronoamperometry, Constant Potential Coulometry

KT5012 SELECTED TOPICS IN PHYSICAL CHEMISTRY

Physicochemical Concepts and the First Law of Thermodynamics, Second and Third Laws of Thermodynamics, Phase diagrams and phase transformations of pure substances, Viscosity and surface tension, Partial molar properties, Raoult and Henry's laws, introduction to phase diagrams of two-component mixtures, Application of thermodynamic laws to reactions and chemical equilibrium, Thermodynamics of ions and electrolytic conductivity, Reaction rates, rate expressions, reaction order, Chromatographic methods, Reaction mechanisms, catalyst

KT5013 ADVANCED POLYMER CHEMISTRY II

Coordination polymerization. Ring-opening polymerization. Atom transfer radical polymerization Copolymerization. Types of copolymerization. Reactivity ratios. Block copolymers. Graft copolymer.

Conductive polymers. Properties of some conductive polymers. Polymerization systems. Polymer Properties and Applications.

KT5014 POLYMERIC COMPOSITES AND CHARACTERIZATION

Introduction to Composite Materials, Composite Components: Matrix and Support Materials, Polymer Composites, Production Methods of Polymer Composites, Properties of Polymer Composites, Usage areas of Polymer Composites, Characterization Techniques of Polymer Composites

KT5015 ADVANCED POLYMER CHEMISTRY I

Polymer concept, classification and nomenclature of polymers, Chemical and physical properties of polymers, Thermal transitions in polymers, molecular weight and molecular weight distribution, determination of molecular weight of polymers, fractionation of polymers and fractionation methods, step-growth polymerization, kinetics of step-growth polymerization, free-radical chain polymerization, kinetics of free-radical chain polymerization, determination of rate constants in free-radical chain polymerization, Anionic polymerization and polymerization kinetic. Cationic polymerization and polymerization kinetic.

KT5016 POLYMER TECHNOLOGY I

General definition and concepts, inputs used in polymer production, polymerization technology, thermoplastics and thermoplastic technology, thermo sets and thermo set technology, elastomers and elastomers technology, fibers and fibers technology, Additives used in polymers, Treatment techniques in polymers.

KT5017 POLYMER TECHNOLOGY II

Physical and chemical properties of polymers, Effect of environment on polymer, Solubility in polymers, Burning of polymers, Electrical properties, Optical properties, Mechanical properties of polymers, Deformation of force kinds, Tension and extension, Elastic Deformation, Viscous Deformation, Viscoelastic Deformation Tension and extension relations in polymer.

KT5018 THERMAL ANALYSIS METHODS

Differential Thermal Analysis (DTA), Differential Scanning Calorimeter (DSC), Calibration and Sample Preparation, temperature gradient, Thermogravimetry (TGA), Temperature Calibration, Thermal Analysis Applications, Reaction Rate and Kinetics, Polymer glass transition temperature, Purity Analysis with DSC, Crystalline Determination, Experimental Procedures, Other Thermal Analysis Methods.

KT5019 NEW AND RENEWABLE ENERGY SOURCES

Energy, energy sources and clean energy concept, Non-renewable and renewable energy sources, Fossil-based energy sources and the environment, Solar Energy, Wind Energy, Hydraulic energy and marine-based energy, Hydrogen Energy and Fuel Cells, Biomass energy, Current availability of renewable energy sources and technologies situation, Future of renewable energy resources and technologies, Comparison of non-renewable and renewable energy resources, Importance of renewable energy resources in energy policies

KT5020 NUMERICAL ANALYSIS AND COMPUTER APPLICATIONS

Summary of computer programming languages, Matrices, Matrix solutions, Numerical solutions of algebraic equation systems, Numerical solutions of non-algebraic equation systems, Numerical solutions of higher order differential equations, Numerical solutions of partial differential equations, Modelling and numerical solutions of fluid flow problems, Modelling and numerical solutions of heat transfer problems, Modelling and numerical solutions of mass transfer problems, Numerical solutions of reaction engineering problems

KT5021 DRYING TECHNOLOGY

Importance of drying, Water activity, Water sorption isotherms, Physical properties of air-water mixtures, Basic principles of drying, Drying rate and its calculation, Factors affecting drying rate, Fruit and vegetable drying, Changes in the structure of dried products and quality elements, Drying methods, Natural and artificial drying, Modelling of drying data.

KT5022 ADVANCED ELECTROCHEMISTRY

Fundamentals of analytical electrochemistry, Carbon electrodes, Film electrodes, Mercury electrodes, Chemically modified electrodes, Solvent and support electrolytes, Electroorganic synthesis, Coatings, Batteries

KT5023 ELECTROCHEMICAL SENSORS

Electrochemistry and basic concepts, electrochemical cell, reference electrode and potential, galvanic cell and electrolytic cell, potentiometry, electroanalytical methods, electrochemical sensors and voltammetry, electroimpedance spectroscopy (eis) and chronoamperometry, Electrochemical sensor cell design, calculated properties of electrochemical sensors, electrochemical sensor examples.

KT5024 THIN FILM COATING TECHNIQUES

Thin film concept; physical vapor deposition method (resistance evaporation, inductive evaporation, arc evaporation, electron beam evaporation and laser evaporation), Magnetron sputtering technique coating, Sol-gel and spin coating technique, Langmuir-Blodgett technique coating, Electrochemical coating and electroplating.

KT5025 POLYMERS DEGRADATION

Thermal degradation, mechanical degradation, photodegradation, enzymatic degradation, biodegradation, mechanical and barrier properties in biodegradation of polymers, biodegradation in a controlled compost environment.

KT5026 BIOPOLYMER

Synthetic and natural polymers, information about biopolymers, usage areas of biopolymers, modification of polymers, mechanical properties of polymers, barrier properties of polymers, smart polymers

KT5027 FOOD PACKAGING

Introduction to food packaging, paper, glass, metal, plastic and cardboard packaging, smart packaging, areas of use of synthetic and biodegradable polymers in food packaging, optical properties, mechanical and barrier properties of biodegradable polymers in food packaging.

KT5028 NANO-SYNTHESIS AND CHARACTERIZATION

Main Nano-Synthesis Methods, Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), X-Ray Diffraction (XRD) Spectroscopy, Fourier Transform Infrared (FT-IR) Spectroscopy, Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS), Ultraviolet-Visible (UV-Vis) Spectroscopy, Other Characterization Techniques Used

KT5029 GREEN CHEMISTRY AND SUSTAINABILITY

Green chemistry and sustainability, Green chemistry and green engineering, Green chemistry principles, Green chemistry; environment, health and safety integration, How do we know it is green?, Path and chemistry selection in green chemistry and green engineering, Material selection; solvents, catalysts and reagents, Reaction conditions and green chemistry, Bioprocesses, From laboratory to facility

KT5030 NANOSCIENCE AND NANOTECHNOLOGY

Nano-science, nano-engineering and nano-technology in the light of developing and transforming science, Current developments in nano-science and nano-technology, Nano-engineering and application areas, Relationship between nano-material properties and measurement methods, Characterization of nanoparticles, Synthesis of nano-particles: Biosynthesis, Synthesis of nano-particles: Chemical synthesis methods, Metal-based nanoparticles, Carbon-based nanostructures, Hybrid nanostructures, Future of nanotechnology

KT5031 NANOTECHNOLOGY AND APPLICATION AREAS

Development process of nanotechnology, Nanotechnological developments in basic sciences, Applications of nanotechnology: Science and education, Applications of nanotechnology: Biotechnology and agriculture, Applications of nanotechnology: Nanoelectronics and computers, Applications of nanotechnology: Aviation and space, Applications of nanotechnology: Pharmacy and nanomedicine, New areas of nanotechnology.

KT5032 INTELLECTUAL AND INDUSTRIAL PROPERTY RIGHTS

Intellectual property law in general, Basic concepts, Main elements of the intellectual property system, Intellectual and artistic works, Moral rights, Trademarks, Patent concept and application processes, Design and application processes, Geographical indication application processes, New plant varieties-Integrated circuit topographies, Know-how (technical and commercial knowledge) concept, protection of know-how, Patent databases, Freedom of activity search and patent mapping concept, Technology transfer concept

KT5033 ENTREPRENEURSHIP

General characteristics of entrepreneurship and entrepreneurs in practice, Creativity and innovation concepts and applications, Innovation models, Innovative Business ideas and applications, Business Plan scope and content for new enterprises, Marketing planning in entrepreneurship, Production and Financial Planning in Entrepreneurship, Strategic planning applications for new enterprises, For new enterprises Marketing plan applications, Production planning applications for new enterprises, Financial planning for new enterprises, Intellectual asset management, Writing and presentation of business plans.

KT5034 PROJECT MANAGEMENT:

Project Management: Introduction, Project management cycle, logical framework, Project life cycle and organization, Project management processes, Project integration management, Project plan development, Resource scheduling, Project time management, Project cost management, Project supply management, Project human resources management, Project communication management, project risk management, Application with computer software support.

KT5035 SCIENTIFIC RESEARCH AND PUBLICATION ETHIC

Introduction to ethical and scientific research methods Ethics and rules in scientific research, Behaviors contrary to scientific ethics, Ethics education in training scientists, Ethical responsibilities of scientists

KT5036 ADVANCED KINETIC

Kinetic, The Reaction Rate, The Factors Effecting on Reaction Rate, The Reaction Order, The Methods of Determination of Reaction Order, The Effect of Temperature on Thereaction Rate (Arrheniusrelation),

Chemical Reactions (Collision Theory), The Mechanisms of Reaction, Application of These Theories on The Reaction Rate

KT5037 COLLOID CHEMISTRY

Introduction to Colloid Chemistry/ Methods of Obtaining Colloids/ Their Colloids Particle Shapes/ Thin Filtering and Semi-permeable Membrane/ The movements of Colloids/ Optical Properties of Colloids/ Viscosity, Surface Voltage/ Tyndall Effect/ Adsorption of Colloids/ Electrical Properties/ Sol-gel Formation of Colloids/ Sol-gel Formation

KT5038/ ANTIMICROBIAL POLYMERS

Overview of antimicrobial polymers, Antimicrobial natural polymers, Synthesis and characterization of antimicrobial polymers

KT5039 CONDUCTIVE POLYMERS

Introduction to Conductive Polymers, Classification of electrochemically active polymers, Electrical and Electrochemical Properties of Conductive Polymers, Conductivity theory and conductivity in conductive polymers, Doping and conductivity property

KT5040 POLYMER PRODUCTION AND PROCESSING

Introduction to Polymers: Basic Concepts and Definitions, The Place and Importance of Polymers in Our Life, Chemical Structure and Classification of Polymers, Polymerization Mechanisms, Polymer Production Methods.

KT5041 ADVANCED SPECTROSCOPIC METHODS

Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of UV/Vis Spectroscopy. Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of Infrared (IR) Spectroscopy. Acquisition of the fundamentals, theoretical aspects, practical examples, and applications of Nuclear Magnetic Resonance (NMR) Spectroscopy.

KT5042 BASIC LABORATORY PRINCIPLES AND METHODS

This course covers laboratory work discipline and safety, physical, chemical, and instrumental analysis methods, the properties of basic laboratory tools and equipment, the preparation methods and calculations of solutions used in analysis, and the evaluation and interpretation of obtained data. Students will understand general hygiene and safety rules to be followed in the laboratory, laboratory working principles, and the principles of basic laboratory equipment and methods. Students will have acquired basic laboratory skills (e.g., weighing, buffer preparation, pH measurement, homogenization, centrifugation). They will have acquired the ability to perform general laboratory procedures.

KT5043 SPECIFIC COMPUTER APPLICATIONS IN CHEMISTRY

Understanding and learning programs such as Origen, Chem Office, UV Probe, PE Spectrum, and Acrobat Professional, which can be used in postgraduate education.