DEPARTMENT OF CHEMISTRY

Content of Doctorate's Degree in Chemistry

COURSE CODE	COURSE NAME AND CONTENTS	T	A	C	ECTS
KIM835	**Organometallic Complexes**	**3**	**0**	**3**	**8**
Purpose and Content	The aim of the course is to be able to follow current issues in the field of organometalic chemistry, to gain information about planning multidisciplinary studies, to gain basic information about preparing publications. Advenced organometalic subjects, current research areas in organometalic chemistry, relationship of organometalic chemistry with other disciplines, literature review on organometalic complexes, converting data obtained from studies into articles.				
KIM833	**Inorganic Polymers**	**3**	**0**	**3**	**8**
Purpose and Content	The aim of the course is to be able to follow current issues in the field of Inorganic Polymers, to get information about planning multidisciplinary studies, to gain basic information about preparing publications. Inorganıc Polymers And Classıfıcatıon Schemes, Inorganıc Polymer Syntheses, Inorganıc Polymer Characterızatıon, Practıcal Inorganıc Polymer Chemıstry.				
KIM819	**Synthesis and Characterization of Polymer**	**3**	**0**	**3**	**8**
Purpose and Content	To have advanced knowledge about synthesis mechanisms of polymers. To have knowledge about characterization of polymers and their physical and chemical properties. Polymerization, molecular weight and microstructure, optical microscopy, electron microscopy, analytical microscopy, scanning microscopy, thermal analysis, x-ray spectroscopy.				
KIM820	**Industrial Plastics**	**3**	**0**	**3**	**8**
Purpose and Content	To give knowledge of synthesis, structure and properties of certain industrial polymers.Polymerization, structure and properties of polyethylene, aliphatic polyolefins, vinyl chloride polymers, fluorine containing polymers, poly (vinyl acetate) and its derivatives, acrylic plastics, plastics based on styrene, miscallenous vinyl thermoplastics, polyamides and polyimides, polyacetals and polycarbonates, cellulose plastics and phenolic resins, aminoplastics and polyesters, epoxide resins and polyurethanes, furane resins and silicone polymers.				
KIM821	**Characterization of Polymers**	**3**	**0**	**3**	**8**

Purpose and Content	Instruct physical, chemical and structural analysis techniques of polymers. Microscopic imaging techniques, structure determination by diffrastion and scattering, electron emission spectroscopy, X-ray emission techniques, UV-Visible, IR spectroscopies, NMR, Ion scattering techniques, mass spectroscopy.				
KIM823	**Chemistry of Fibers**	**3**	**0**	**3**	**8**
Purpose and Content	To give knowledge about synthesis and preparation, structure, function and properties of several types of fibers. Synthesis and preparation, structure, function and properties of fibers: polyester fibers, polyamide fibers, polypropylene fibers, vinyl fibers. Natural fibers properties and their preparation processes; wool and related mammalian fibers, silk, jute and kenaf, other long vegetable fibers: abaca, banana, sisal, henequen, flax, ramie, hemp, sunn, and coir, cotton fibers, regenerated cellulose fibers, cellulose acetate and triacetate fibers, acrylic fibers, aramid fibers.				
KIM824	**Decomposition and Stability of Polymers**	**3**	**0**	**3**	**8**
Purpose and Content	To give knowledge about the types of polymer degradation and degradation mechanisms and the methods to prevent them. Polymer degradation in general, methods of studying polymer degradation, types of polymer degradation, polymer stabilization techniques.				
KIM825	**Asymmetric Organic Synthesis**	**3**	**0**	**3**	**8**
Purpose and Content	In the scope of the coarse the students will learn the synthetic methods to obtain enantiomers with high enantiomeric excess. The course covers the types of stereoisomers and their nomenclatures, and asymmetric reactions such as asymmetric alkylation, aldol, oxidation and diels alder. In the scope of the coarse, recently published papers will also be studied.				
KIM826	**Polymers for Specific Purposes**	**3**	**0**	**3**	**8**
Purpose and Content	To make the students informed with the knowledge of some selected uses of polymers and their applications. Some selected polymers for special purposes: conductive polymeric materials, drug design and activity, synthetic biomedical polymers, geotextiles, smart materials, high-performance thermoplastics, construction and building, flame-resistant textiles, water soluble polymers, anaerobic adhesives, hydrogels, emerging polymers.				
KIM828	**Principals and Processes of Adsorption**	**3**	**0**	**3**	**8**

Purpose and Content	Teaching the Fundamentals and Theory of Adsorption; Adsorption Characterization, Adsorption Kinetics, Adsorption Equilibria, Industrial Applications of Adsorption Process and Giving Examples. Introduction, Fundamentals of Adsorption, Adsorption Equilibria, Adsorption Kinetics, Adsorption Column Dynamics, Pressure-Dependent Adsorption, Equilibrium Theory of Pressure-Dependent Adsorption, Industrial Applications of Adsorption Process.				
KIM829	**Structure Elucidation By Mass Spectroscopy**	**3**	**0**	**3**	**8**
Purpose and Content	To learn theory of mass spectrometry which is one of the structure elucidation methods. Instrument components of mass spectrometer, Chemical ionization and electron impact methods,determination of molecular formulas, fragmentation patterns,Mass spectrum and structure analysis, LC-MS, GC-MS.				
KIM830	**Composite Materials and Structure Design**	**3**	**0**	**3**	**8**
Purpose and Content	Ability to learn and use optimization techniques to design composite materials. Classification and characteristics of composite materials, reinforcements and matrices, interfaces, material behavior and process modeling, nanocomposites,experimental design and modeling techniques.				
KIM801	**Theoretical Principals Of Analytical Chemistry I**	**3**	**0**	**3**	**8**
Purpose and Content	To learn calibration, analytical measurements, and evaluation of the analytical measurements. The basic principles of calibration, linear calibration model and the linear calibration errors, alternative types of calibration, the reliability of analytical measurements, trace analysis, precision, analytical results, presentation, analytical interpretation of results, data analysis, foundations, pile analysis, classification: data structures, modeling, analytical, images, multi-component analysis.				
KIM802	**Theoretical Principals Of Analytical Chemistry II**	**3**	**0**	**3**	**8**
Purpose and Content	To learn the basic theoretical principles of analytical chemistry. The purpose of analytical chemistry, analytical chemistry methods, sample preparation, the basic principles of analytical measurements, the signals in analytical chemistry, analytical types and characteristics of the signals, the signal for creating mathematical modeling, statistical evaluation of analytical results, the reliability of analytical observation and measurements, qualitative and quantitative evaluation of analytical results, variables analysis, experimental design, optimization of analytical processes.				
KIM803	**Metod Choice In Analysis**	**3**	**0**	**3**	**8**

Purpose and Content	To learn principles of selection of analysis methods and to gain ability to select an analysis method. Factors to be considered in the selection method in analitical chemistry; Sample preparation and separation techniques, stationary phase, mobile phase, column packing materials for chromatographic techniques; Chromatographic theory; Separation mechanism; Quantitative analysis, qualitative analysis; Detection systems, Spectroscopic methods; Standard deviation, internal standard; Method validation.				
KIM804	**Advanced Environmental Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	The purpose of this course is to recognize the poison that adversely affect biological life and their forms of existence, to provide learning protection from the effects of environmental poisons in living organisms.This course covers factors of toxicity of ksenobiotics on environment, toxicology of air, water and soil pollution, toxicity of environmental poisons and analysis of samples, chemical weapons and toxicology.				
KIM805	**Analysis Of Trace Elements I**	**3**	**0**	**3**	**8**
Purpose and Content	To learn about the importance of trace elements and trace element analysis methods. Basic laboratuvary skills, Trace elements and importance, Take samples for trace elements analysis, Preparation of samples for trace element analysis, saving of samples, seperation and concentration techniques, detection of analysis techniques, Reference methods and sentetic sampling, Standartion, calibration and detection limits, Molecule spectrometry and trace element analysis, Mass spectrometry(MS) and combine techniques, Metal encolouring and importance, different trace elements techniques, Different trace elements techniques.				
KIM806	**Analysis Of Trace Elements II**	**3**	**0**	**3**	**8**
Purpose and Content	To learn about the importance of trace elements and trace element analysis methods. toxic effects of trace elements, importance of trace elements about environment, Metal ligand interaction chelation and chelating agents, detection of metal ligand interaction with UV spectrometry, solid phase extraction trace element analysis with likid phase extraction, Nucleer analtytical methods, atomic spectroscopic methods trace element analysis with atomic spectroscopic methods, trace element analysis with electroanalytical methods trace element analysis with atomic spectroscopic methods, trace element analysis with AAS, AFS and AES sample trace element analysis.				
KIM807	**Organic Synthesis By Microwave**	**3**	**0**	**3**	**8**
Purpose and Content	To learnn microwave method of the synthesis various organic compounds. Short History of Microwave Assisted Organic synthesis, Microwave Theory, Microwave Devices, Microwave Application Techniques, Microwave Modeling Using a Reaction, Microwave Synthesis and Comparison of the Classical Synthesis, CEM Discover Microwave Device Applications.				

KIM808	**Modern Solvent Systems**	**3**	**0**	**3**	**8**
Purpose and Content	Giving information about the effects of solvent in homogen systems,and classifications them. History of subject. The effects between solvent and solute. Classification of solvents. The effect in homogen equilibrium condition. The effect of solvent in homogen reactions speed. The effect of solvent in adsorbtion spectra of organic compounds. Empirical parameters os solvent polarity. Purification of organic solvents. Properties and using.General dissolving methods, dissolving under atmospheric conditions, wet digestion method, dry ashing method, dissolving at high pressure.				
KIM809	**Synthesis Of Heterocyclic Compounds By The Microwave Method**	**3**	**0**	**3**	**8**
Purpose and Content	Microwave method was to teach the synthesis of various heterocyclic compounds. Introduction to the five-member hetosiklik compounds, pirrolidinler, pirrolin and pirrol, indoles, and ftalimidler carbazol, tiyofenler, imidazole, benzimidazoles, pyrazol, izoksazoller, indazoller, oxazole, benzoxazole, benzotiyazoller, triazoles, oksadiazoller, tiyadiazoller, tetrazoller. Six-membered heterocyclic compounds; piridinler, dihydropyridines, piperidinler, pyrimidines, piperazine, pyrazines, Triazines, coumarins synthesis, summary and conclusions.				
KIM810	**Aromatic Heterocyclic Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	To give Aromatic Heterocyclic compound(five and six-membered) synthesis, and determined of them. Indroduction, synthesis of five-membered heterocycles, pyrrolidines, pyrrolines and pyrroles, indoles, carbazoles and phthalimides, thiophenes, imidazoles pyrazoles,isoxazoles,indazoles,oxazoles,benzoxazoles, benzothiazoles, triazoles, oxadiazoles, thiadiazoles,tetrazoles, synthesis of six-membered Heterocycles; pyridines,dihydropyridines, quinolines, pyrimidines, quinazolines, piperazines, pyrazines,triazines, benzopyrones(coumarines,chromones), conclusions and references.				
KIM811	**Clarification of The Structure In Organic Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	Learning of specroscopic methods and spectrum interpretation. The course includes NMR, IR and mass spectroscopy methods used in the structural analysis of organic compounds. First of all, IR and mass spectroscopy methods will be studied in detail, then these methods will be combined with NMR and used to elucidate simple to complex organic compound structures.				
KIM812	**Oxidation-Reduction In Organic Chemistry**	**3**	**0**	**3**	**8**

Purpose and Content	To study on oxidation-reduction methods used in the synthesis of various functional groups in organic chemistry.To examine synthetic methods of oxidation-reduction reactions used in the synthesis of various functional groups of organic chemistry.				
KIM813	**Advanced Organic Chemsitry Laboratory**	**3**	**0**	**3**	**8**
Purpose and Content	To learn different methods of synthesis of various organic compounds. Basic concepts, synthesis of organic compounds and reactions in a few steps, the implementation of some laboratory techniques, spectroscopic methods, the use of organic laboratory.				
KIM814	**Bioactive Fused Heterocyclic Compounds**	**3**	**0**	**3**	**8**
Purpose and Content	To gain general information about bioactive fused heterocycles compounds. Introduction. General information about heterocyclics.Electrophilic, Nucleophilic and Radicalic Substitution of Heterocycles.Acid-Base Properties of Heterocycles.Spectroscopic Behavior of Heterocycles.General information about bioactive compounds.Triazolotriazines; 1,2,4-triazolo mercapto and aminonitriles; triazolotriazoles; 1,3,4, thiadiazoles; triazolooxadiazoles; triazolothiazoles. Research and interpretation of bioactive-heterocycle articles.				
KIM832	**Analytical Techniques in Environmental Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	To learn calibration, analytical measurements, and evaluation of the analytical measurements. The basic principles of calibration, linear calibration model and the linear calibration errors, alternative types of calibration, the reliability of analytical measurements, trace analysis, precision, analytical results, presentation, analytical interpretation of results, data analysis, foundations, pile analysis, classification: data structures, modeling, analytical, images, multi-component analysis.				
KIM834	**Inorganic Stereochemistry**	**3**	**0**	**3**	**8**
Purpose and Content	To understand the geometries of inorganic compounds and complexes. VSEPR Model, Hybridization Model, Apolar and Polar Molecule.				
KIM831	**Advanced Subjects in Analytical Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	To learn the basic theoretical principles of analytical chemistry. The purpose of analytical chemistry, analytical chemistry methods, sample preparation, the basic principles of analytical measurements, the signals in analytical chemistry, analytical types and characteristics of the signals, the signal for creating mathematical modeling, statistical evaluation of analytical results, the reliability of analytical observation and measurements, qualitative and quantitative evaluation of analytical results, variables analysis, experimental design, optimization of analytical processes.				

KIM827	**Advanced Topics in Inorganic Chemistry**	**3**	**0**	**3**	**8**
Purpose and Content	To learn about the structure and reactions of organometallic compounds. History of organometallic chemistry; Ligands, naming and 18 electron rule; Metal carbonyls; Nitrosil, dinitrogen and dioxygen complexes; Alkyl complexes; Karben and carbin complexes; Alken and alkyne complexes; Enyl complexes; Cyclobultradiene, Tropyllium and cyclooctatetraene ligands; Aren complexes.				
KIM815	**Ligand Field Theory**	**3**	**0**	**3**	**8**
Purpose and Content	To Learn Ligand Field Theory and its Applicatons.Energy Levels and Spectroscopic Terms, Ligand Field Spectra, Splitting of the Terms in the Tetrahedral and Octahedral Field, Applications of Orgel and Tanabe-Sugano Diagrams, The Effect of Ligand Field on Magnetic Properties.				
KIM816	**Thermal Analysis Method**	**3**	**0**	**3**	**8**
Purpose and Content	To learn about thermal analysis techniques and applications areas. Given information about thermal analysis techniques and Instruments. Techniques are reviewed based on the measurement of sample weight and changes ın thermal propertıes. The ınterpreted of DTA and DSC curves. Given information about applications of DTA and DSC.				
KIM817	**Modification of Polymers**	**3**	**0**	**3**	**8**
Purpose and Content	1-To teach modification methods of natural and synthetic polymers 2-To teach characterization methods of modified polymers 3-To teach uses of modified natural and synthetic polymers in daily life. Modification methods of polymers, Modification of natural polymers (Cellulose, starch, chitinchitosan and lignin), Modifacation of synthetic polymers (PVC, polystyrene, polyamide, polyethylene, polypropylene,epoxide containing polymers, phenol-formaldehyde, acrylate andmethacrylate based polymers), Applications of the modified polymers.				
KIM818	**Functional Polymers**	**3**	**0**	**3**	**8**
Purpose and Content	Use and synthesis of functional polymers that have special chemical groups have been improved. Functional polymers have advanced optical and/or electrical properties. They are used in important areas such as semiconducting polymers, biomimetic materials, drug releasing. This course is supposed to be very helpful for master and PhD students who study polymer chemistry. 1- Preparation of functional polymers 2- Characterization and properties of functional polymers 3- Polymeric agents 4- Polymeric catalyses 5- Purification of functional polymers 6- Organic synthesis of polymeric carriers 7- Biological applications of functional polymers 8- Controlled releasing systems 9- Preparation of polymeric substrates for active groups 10- Technological application of functional polymers.				

LUEE801	**Scientific Research Techniques and Scientific Ethics**	**3**	**0**	**3**	**8**
Purpose and Content	To be able to know how a process in a scientific research proceeds and how a scientific report must be prepared. Fundamental concepts and information about the science, the structure of scientific research, scientific methods and different ideas on these methods, data acquisition methods (quantitative and qualitative), registration, analysis, interpretation and reporting of datas.				
KIM897	**PhD Seminar**	**0**	**2**	**0**	**6**
Purpose and Content	To gain the ability of the oral presentation and discussion,to decide on the objectiv es of the thesis work. To present the thesis work.				
KİM8098D	**Course Field of Specialization**	**4**	**0**	**0**	**4**
Purpose and Content	To give the general knowledge related to the thesis work, to dev elop the ability of analy tical thinking. To learn to perf orm experiment, to research and to observ e about the thesis work.				
KİM8098T	**Thesis Field of Specialization**	**4**	**0**	**0**	**4**
Purpose and Content	To give the general knowledge related to the thesis work, to dev elop the ability of analy tical thinking. To learn to perf orm experiment, to research and to observ e about the thesis work.				
KIM899	**PhD Thesis Research**	**0**	**1**	**0**	**26**
Purpose and Content	To gain the ability of getting the scientif ic inf ormation, its ev aluation and interpretation by conductiv e scientif ic research. To perform thesis work.				
KIM896	**PhD Qualification**	**0**	**1**	**0**	**26**
Purpose and Content	Preparing for PhD qualifying exam. Doctoral qualification study.