Course Title	Unit	Description	Type* of Course
Physics I	3	Introduction to Mechanics, work and energy, waves, sound, heat	B
General Foreign Language (English)	3	Describing English Grammar and Vocabulary with reading and writing homework and periodical English exams.	G
General Chemistry I	3	A study of matter and measurement , atom, bonding, chemical formula and equations, thermochemistry and thermodynamics	B
Physical Education I	1	General Physical Education and Track and Field	G
Islamic Thought I(Genesis & Resurrection)	2	Quran's Instructions for better life and interacting with other people in a society	G
Mathematics I	3	(General Mathematics):Cartesian coordinates; polar coordinates; complex numbers; addition, product, root & geometrical representation of complex numbers; polar representation of complex numbers; function; functions algebra; limit and relevant theorems; infinite limit and limit in infinite; left-hand and right-hand limit; connectivity; derivative; derivation formula; inverse function and its derivative; trigonometric functions derivative and their inverse functions; Rolle's theorem; mean theorem; Taylor expansion; geometrical and physical applications of derivative; curves and acceleration in polar coordinates	B

Course Title	Unit	Description	Type* of Course
Statics	2	Basic concepts of mechanics and vectors, Statics of particles and rigid bodies, Concepts of force systems, resultants, equilibrium, moments and couples, Centroids and Centre of gravity, Moment of inertia, Friction, Method of virtual work, Planar and three dimensional problems including trusses, arches and frames.	M
Physics II	3	A study of Electricity and magnetism; light and optics.	B
Crystallography and Lab	3	A study of Bonding, crystal systems, Bravais lattice, elements of crystal symmetry, reciprocal lattice, stereographic projection, elements of X-ray crystallography.	M
Analytical History of Early Islam	2	Description and Interpretation of principles which are mentioned in Islam and Quran.	G
Mathematics II	3	Matrix Algebra: Determinants and their properties, Applications to systems of linear equations, Homogeneous systems; Series: Convergence of series of real numbers, Tests of convergence, Series of functions; Integration: The Definite Integral; Definition: The Riemann Sum; Techniques of Integration including advanced methods of substitution, partial fractions, by parts and reduction formulae, Applications; Improper Integrals: Convergence; Partial Differentiations, total derivations.	B

Population and Family planning	2	A brief guide about family life and control of population	G
Course Title	**Unit**	Description	**Type* of Course**
Chemical Physics of Materials	3	Concepts of Behavior of gases: equation of state of ideal and real gases, heat capacity of an ideal gas, mixtures of ideal gases. The first law of thermodynamics : intensive and extensive properties, internal energy and the first law of thermodynamics, chemical equilibrium, enthalpy of formation and the Hess law, heat of reactions, the second law of thermodynamics, the statistical interpretation of entropy	M
Physical Properties of Materials I	3	Concepts of Atomic structure of metals; atomic binding; metal structure; crystal defects; classification of alloys; phase diagrams; solid solution, eutectic, peritectic, monotectic, eutectoid, ironcarbon diagram; TTT diagrams; precipitation hardening, ternary diagrams.	M
Instrumental Analysis Chemistry and Lab	3	Introduction to modern analytical instruments and Identify appropriate *instrumental* methods for given *chemical analysis* problems.	E
Strength of Materials	3	Concepts of stress and strain, combined stresses, analysis of stresses and deformation in bodies loaded by axial, torsion, and bending loads.	M
General Persian Language	3	Discussing the poem and prose from old literature of Persian	G

Metallography Lab	1	Become familiar with metallography and learn how to sectioning, mounting, grinding, polishing and etching samples. Examine photomicrographs that are obtained by using optical microscopes equipped with digital cameras.	M
Mechanical Properties of Materials I	3	A study of behavior of metals under simple and combined stress systems, elements of theory of elasticity, plastic deformation, elements of theory of dislocations, strengthening mechanisms	M
Thermodynamics of Materials I	3	Basic thermodynamic concepts are applied to materials. Calculations involving enthalpy, entropy, and Gibbs' free energy are studied. Interrelationships among properties are emphasized.	M
Course Title	**Unit**	Description	**Type* of Course**
Manufacturing Process of Ceramics I	2	A study of the methods and techniques are used in the fabrication of ceramics.	S
Manufacturing Process of Ceramics I Lab	1	Manufacturing different ceramic objects with casting method	S
Ceramics Structure	2	Introduction of the crystal structure of ceramics	S

General Chemistry I Lab	1	introduction to basic lab safety and fundamental techniques of general chemistry: separation, filtration, carrying out simple reactions, titrations, etc.	B
Islamic Though II(Prophecy & Imamate)	2	Quran's instruction for better life and etc.	G
Physical Properties of Materials II	2	Kinetics of phase transformation in the solid state, diffusion, nucleation, annealing, recrystallization grain growth, diffusional transformation in steels, martensitic transformation.	M
Manufacturing Process of Ceramics II	2	A study of powder, colloidal and sol-gel processing, forming methods, drying, sintering and grain growth. Relation of processing steps to densification and microstructure development	S
Manufacturing Process of Ceramics II Lab	1	Study on the influence of sintering temperature on strength, water absorption and porosity percentage of ceramics	S
Course Title	**Unit**	Description	**Type* of Course**
Mechanical Properties of Materials I Lab	1	mechanical tests to measure metal and alloys strength, elastic constants, and other material properties as well as their performance under a variety of actual use conditions and environments.	M
Differential Equations	3	Nature and origin of differential equations, first order equations and solutions, linear differential equations with constant coefficients, systems of	B

		equations, power series solutions, operational methods, Laplace Transform methods.	
General Workshop	1	Manufacturing of industrial part with wood	M
Thematic Interpretation of Holy Quran	2	Interpretation of holy Quran	G
Mechanical Properties of Materials II	3	A study of elements of elastic plastic deformation of materials and the role of crystal structure. Strengthening and toughening mechanisms. Fracture; including fatigue, stress corrosion and creep rupture. Test methods	E
Engineering Mathematics	3	Fourier series and integrals, Fourier transform Partial differential equations Analytic Function, Conformal mapping, and different integrals	B
Fundamental of Electrical Engineering	3	study of the fundamental concepts and building blocks of electrical and electronics circuits including Circuits, circuit elements, circuit laws, node and mesh analysis, circuit theorems, energy storage, capacitors and inductors, circuits with switches, transient response, sine waves and complex analysis, phasors, impedance, ac power.	M
Life Style (Applied Ethics)	2	A study of importance of morality in our life	G

Course Title	Unit	Description	Type* of Course
Transport Phenomenon	3	introduction to the molecular mechanisms of momentum transport (viscous flow); energy transport (heat conduction); mass transport (diffusion); isothermal equations of change (continuity, motion, and energy); the development of the Navier-Stokes equation; the development of non-isothermal and multicomponent equations of change for heat and mass transfer; and exact solutions to steady-state, isothermal unidirectional flow problems and to steady-state heat and mass transfer problems.	M
Material Kinetics	3	The concept of kinetic, a comparison between kinetics and thermodynamics, chemical kinetic : the rate of reactions, rate laws, the order or reactions, theories of reaction rates (collision and activated complex), The effect of temperature, pressure, concentration and catalyst on the rates of reactions. Transport Kinetic: A review on mass transfer in metallurgical reactions (diffusion and convection).	S
Numerical Analysis	2	Error and approximation, roots of equations, Solving system of linear equations using different methods. Solving system of non-linear equations, Curve fitting and Interpolation, Numerical integration and differentiation, Solving Partial differential equations, case studies in engineering.	B

E.S.P(English for Specific Purposes)	2	Translation of material science books from English to Persian.	E
Theory of Glass	3	A study of the atomic-level structure of oxide glasses and the relationships between composition, properties and structure of glass forming systems.	S
Method of Analysis and Identification of Ceramic Materials	2	Essential techniques for materials characterization, Techniques suitable for elemental and phase analysis like AA, XRD, XRF, EDS, ICP - OES, SEM, and TEM.	S
Manufacturing Process of Ceramics III	2	Introduction to devices, triaxial ceramics, high aluminas, tape fabrication, metallizations, thick film processing	S
Thermal Properties of Ceramics	2	A study of crystal physics underlying heat capacity, internal energy, phonon and photon conduction, and thermal expansion and study the properties of them for rationalize the behavior of a wide variety of ceramic materials in severe thermal environments	S
Course Title	**Unit**	Description	**Type* of Course**
Scientific and Technical Materials Transfer	1	Research methods , write scientific articles and giving presentation	S
Refractory Materials	2	A study of manufacture, properties, uses, performance, and testing of basic, neutral and acid refractories.	S

Glazes Theory	2	A study of glaze materials, coloring ingredients, decorating methods, compounding of glazes. Processing and application of glaze, firing properties and defects of glazes.	E
Theory of Glass Lab	1	Examines the properties and behavior of molten glass along with basic forming techniques, including off-hand shaping, molding and casting	S
Engineering Ceramics	3	Introduction to the properties, manufacturing and design of advanced ceramics, nanostructured ceramics, films and coatings.	E
Manufacturing Process of Ceramic III Lab	1	a study of the effect of temperature on high alumina ceramic rulers' properties like strength, porosity percentage and etc.	S
Identification Methods Lab	1	Practical knowledge of construction and operation of XRD, XRF, EDS, ICP - OES, SEM, and TEM.	S
Porcelain Lab	1	Manufacturing porcelain objects	S
Course Title	**Unit**	Description	**Type* of Course**
Porcelain Theory	2	A study of *porcelain* and it's philosophy, structure, properties, uses, and laboratory procedures associated with this *material*	S
Sport I	1	I was a member of aerobic team	G

Electrical and Optical Properties of Ceramics	2	The application of ceramic chemistry and physics to the development and evaluation of electronic, dielectric, magnetic, and optical properties. Emphasis is placed on the relationships between properties and crystal structure, defects, grain boundary nature, and microstructure	S
Refractory Materials Lab	1	Study on the effect of composition on physical and mechanical properties of fireclay	S
Project	3	Designed for the undergraduate students who wish to engage in research and it has to be arranged with their correspond instructor.	M
Training	2	Working for 270 hours (10weeks) in a company with related field of the major which is specialized to make students ready for work and gain experimental experience with a completion report and final presentation	M
Mechanical Properties of Ceramics	2	The theory and testing practice related to design based on the mechanical properties of ceramics.	E
Physics and Chemistry of Cement	2	Cement components and their phase relations Portland cement and its minerals. High temperature chemistry. Chemistry for production of Portland cement. Hydration of the individual cement phases and cement as a whole, reaction progress and products. Durability of cement based systems. Chemical admixtures and mineral additives for concrete.	E

Course Title	Unit	Description	Type* of Course
Advanced Materials	2	introduction to traditional and modern applications of materials providing a broad overview of all aspects of current materials technology	E
Special Glass	2	Definition of glass, glass raw materials and their functions, elementary concept of glass manufacturing process specially for container glass, different types of glasses, application of glasses	E
Introduction to Reading &Reciting of Holy Koran	1	Description and Interpretation of principles which are mentioned in Quran (Main book For Islam)	G
Industrial Drawing	2	Draw and analyses of industrial parts. Drawing perspective, and draw views from an perspective shape.	M
Political Though of Imam Khomeini	2	Reading a book about Imam Khomeini's political points of view	G
Fundamental of Electrical Engineering Lab	1	learn to use *electrical* instruments including function generators, oscilloscopes, and multimeters	M
Physics I Lab	1	Implementing theoretical principles of Temperature and Heat Physics in a physics laboratory in practical ways.	B
Physics II Lab	1	Review Ohm's Law, Kirchhoff and Paul Whiston laws, Study of electrical conductivity and	B

		potential levels in graphite sheet, Getting pregnant and getting rid of capacitors, The force enters the current conductor wire in the magnetic field, Study of alternating current circuits and investigate the capacitance of the capacitor and measure the dielectric coefficient	
History of Culture and Civilization of Islam and Iran (Referred to professor)	2	Description and Interpretation of principles which are mentioned in Islam and Iran	G
Course Title	**Unit**	Description	**Type* of Course**
Imam's Will(Referred to Professor)	1	A study of Imam Khomeini's will, which is pieces of advice about religion and politics.	G
Pre-University Mathematics(Referred to Professor)	2	College Courses Remind	P
Computer fundamentals and Programming(Referred to Professor)	3	Introduction in programming languages such as Fortran, Data types and declarations, statements, expressions and assignment, procedures and functions, Files Applications to some numerical problems.	B