General Specifications, Program and Syllabus of Bachelor's Degree in

Industrial Design

Basic Courses:

No.	Course	Credit	Hour			Pre-requisite
			Total	Theo.	Prac.	
1	Fundamentals of Visual Arts I	3	68	34	34	
2	Fundamentals of Visual Arts II	2	85	17	68	1
3	Basic Design Workshop I	3	102		102	
4	Basic Design Workshop II	3	102		102	3
5	Modeling I	2	68		68	23,29,30
6	Modeling II	2	51	17	34	23,5
7	Basic Photography I	2	68		68	
8	Basic Photography II	2	68		68	7
9	Industrial Modeling	2	68		68	2
10	Form and Space	2	51	17	34	2,11,9
11	Geometry I	2	51	17	34	17,22
12	Geometry II	2	51	17	34	18,22
13	Introduction to Art in History I	2	34	34		
14	Introduction to Art in History II	2	34	34		13
15	Islamic Art & Civilization	2	34	34		
16	Human Resources Engineering (Ergonomics) I	2	34	34		
17	Applied Mathematics I	2	34	34		
18	Applied Mathematics II	2	34	34		17
19	Physics I (Statics)	2	34	34		18
Total		42	1071	357	714	

Main Courses:

No.	Course	Credit	Hour			Pre-requisite
			Total	Theo.	Prac.	
20	Physics II (Systematic Fundamentals)	2	51	17	34	19
21	Physics III (Electricity and Optics)	2	51	17	34	18
22	Industrial Drawing I	2	51	17	34	
23	Industrial Drawing II	2	51	17	34	23
24	History of Industrial Design	2	34	34		14
25	Human Resources Engineering (Ergonomics) II	2	34	34		16
26	Evaluation of Industrial Products	3	68	34	34	16,38
27	Objects Design in Islamic Civilization	2	34	34		
28	Industrial Products Management and Economics	3	51	51		
29	Production Materials & Methods I	2	51	17	34	
30	Production Materials & Methods II	2	51	17	34	
31	Production Materials & Methods III	2	51	17	34	
32	Industrial Sociology	2	34	34		
33	Computer- Aided Design	2	51	17	34	18
34	Technical Design I (Fundamentals)	2	51	17	34	19
35	Technical Design II (Machine Elements)	2	51	17	34	20,34
36	Technical Design III (Hydraulic & Pneumatic Control)	2	51	17	34	18,35
Total		36	816	408	408	

Specialized Courses:

No.	Course	Credit	Hour			Pre-requisite
			Total	Theo.	Prac.	
37	Fundamentals of Industrial Design I	2	32	32		24
38	Fundamentals of Industrial Design II	3	51	16	34	2,10,37
39	Industrial Design Project I	4	96	32	64	
40	Industrial Design Project II (Packaging)	2	51	17	34	12,31,39
41	Industrial Design Project III (Human Resources)	2	85	17	68	25
42	Industrial Design Project IV (Fast Plans)	3	85	17	68	39
43	Industrial Design Project V (Environment)	3	85	17	68	39
44	Industrial Design Project VI (Present & Future)	3	85	17	68	39
45	Industrial Design Project VII (Furniture)	2	51	17	34	39
46	Industrial Design Project VIII (Bionics)	2	51	17	34	39
47	Industrial Design Project IX (Factories Relationship)	5	136	34	102	
48	Final Project (Theoretical and Practical)	6	153	51	102	
49	Training					
Total		37	969	289	680	

Fundamentals of Visual Arts I

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : None
Goals : introduction of students to general and basic components of works of art and finding ability to discriminate them in an artistic work and giving opinion to them;

Syllabus:

Subjects of introduction to conceptions including:

Point, line, surface, movement, texture, balance, development, rhythm, light, shadow, coordination, compatibility, composition, etc;

Note: Examples and subjects shall be derived from nature, environment, artificial objects and works of art*. According to this course being common in the fields of Practical & Visual Arts, the examples shall be selected as possible as comprehensive and intra-fields or in compliance with all art fields to enable students to apply these basics for their field within an extensive scope after end of education.

*Works of art are mainly chosen among brilliant works and arts and literature of traditional arts in Islamic period particularly Iran after Islam.

Fundamentals of Visual Arts II

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Fundamentals of Visual Arts I
Goals : introduction of students to general and basic components of works of art and finding ability to discriminate them in an artistic work and giving opinion to them;

Syllabus:

Subjects of introduction to conceptions including:

- Composition and color

Note: examples and subjects shall be selected by professor among nature, artificial environment, and works of art*.

- According to this course being common in the fields of Practical & Visual Arts, the examples shall be selected as possible as comprehensive and intra-fields or in compliance with all art fields to enable students to apply these basics for their field within an extensive scope after end of education.
- Color is used more than the last semester in this course, addressing the color applications in the art fields especially painting, conceptions and their compositions.

*Works of art are mainly chosen among brilliant works and arts and literature of basic traditional arts in Islamic period particularly Iran after Islam.

Basic Design Workshop I

No. of Credit : 3
Type of Course : Workshop
Prerequisite : None
Goals : harmony of students' view and hand to draw what they see and think and want.
Syllabus:

- Introduction to drawing instruments, introduction to line, its types and harmony in drawing;
- Introduction to conception of line and plan of conceptions, senses and nature of objects;
- Introduction to common drawing methods of above mentioned items;
- Introduction to works of famous artists in introduction and representation of above mentioned items;
- Drawing fields are: nature, inanimate nature, man*;

*Face, hand and the whole figure by preserving and following legal limits;

Basic Design Workshop II

No. of Credit : 2
Type of Course : Workshop
Prerequisite : Basic Workshop I
Goals :

- Harmony of view and hand and mind;
- Ability to distinguish power of selection of the best drawing works among several good drawing works;
- Offering plan of good quality;

Syllabus:

- Introduction to conception of light and shadow, presenting conceptions and senses and nature of objects;
- Introduction to conception of composition, introduction to common drawing methods, introduction of students to curve, concise design and simulation, precise and simple design under lowest lines and such alike;
- Exercising common design, design with another hand, distance design, design from abnormal view angles;

Subjects:
Nature, inanimate nature, creatures, design of face and hand, response of statuses in human emotional nature, body movements and muscles;
During Design II in workshop, professor presents also some works and artistically criticizes the famous design works[2].

1- Refer to Note of page A02.
2- Brilliant works for criticism shall be tried to be selected among issues and items of Iran after Islamic Revolution and works of artists after Islam.

Modeling I

No. of Credit : 2
Type of Course : Practical
Prerequisite : Industrial Drawing I, Production Materials and Methods I and II
Goals : introduction to different materials and its applications in producing models in order to introduce 3D design ideas;

Syllabus:

- Definition of maquette and purpose of its production;
- Types of maquette and introduction to different materials;
- Selecting modeling materials according to its application;
- Application of different materials in producing combined maquettes (using soap, paraffin, glue and paper, glass paper and paperboard, foam, etc);
- Introduction to modeling instruments;
- Painting and final finishing;
- Introduction to assembling methods in maquette;

It is necessary to perform practical exercises for all mentioned items by observing the scales in modeling.

Modeling II

No. of Credit : 2
Type of Course : Theoretical and Practical
Prerequisite : Modeling I, Industrial Drawing I
Goals : introduction to scientific principles of modeling and execution method in process of industrial design projects;

Syllabus:

This course includes two theoretical and practical sections as follows:

A. Theoretical:
   - Geometrical and executive fundamentals of using industrial drawings in production;
   - Dimensional analysis;
   - Theory of similarity and its applications;
   - Types of similarity (geometrical, static and dynamic);
   - Principles of geometrical measurement and preparing and regulating industrial drawing from current industrial products and introduction to application of measurement tools;
   - Application of 2D and 3D coordinates in measurement and production;
   - Definition of model and its types: experimental and mathematical models;
   - Purpose of model and its hypotheses;
   - Effective factors on model design;
   - Types of experimental models from maquette to final model (prototype);
   - Combination of model and maquette;
   - Summary of mathematical models;
   - Computer application in producing industrial models;

B. Practical: this section includes three practical works in which application of theoretical subjects are experienced:
   1- Preparing one type of woody models for casting in sand;

2- Preparing executive drawings of a simple industrial production (including all details of material, production method, sizes and precision);
3- Producing example of drawings of note 2;

Basic Photography I

No. of Credit : 2
Type of Course : Practical
Prerequisite : None
Goals : introduction to photography, developing and printing black & white photos;
Syllabus:

- Introduction to camera and its performance method;
- Introduction to black and white film;
- Introduction to photometry and its performance method;
- Introduction to easy photo taking;
- Introduction to dark room and its instruments (black and white);
- Introduction to developing and printing black & white photos;
- Practical exercises in the above mentioned items;

Modeling

No. of Credit : 2
Type of Course : Practical
Prerequisite : Visual Communication II
Goals : reaching a complete dominance on presentation and production of complicated models, reinforcing innovation of students in 3D imagination and further enjoyment of this method, and artistic description in responding the modeling requirements of specialized projects of industrial design;
Syllabus:
This course is presented in two chapters, each including 1 credit, as follows:
1st Chapter: training the concepts and principles of volumetric description with major of industrial design, executed in compliance with the short-term and sequential practical exercises (magnificent levels) by using the basic visual elements according to the texture, color and material.
2nd Chapter: method of producing complicated models with multidimensional view of different materials in order to understand values of a model in terms of statics, balance, equilibrium, and scale by showing the current examples and analysis;
It shall be noted that the diversity of materials and familiarity with tools and framing are limited to practical works of two semesters of students.

Form and Space

No. of Credit : 2
Type of Course : Theoretical and Practical
Prerequisite : Fundamentals II, Geometry I, Modeling
Goals : discussing the geometrical forms and models and finding relation of form and macro spaces in industrial design from space form to macro space in interaction with forms;
Syllabus:
Practices of this course in research and practical projects are related to the structure, form and formation of form based on the special function, internal and external functional relation and spatial relation of form in statics and dynamics, and analyzing forms of a unique collection together and concerning the space including it in space (natural and designed), analyzed then executed through alternative programs.
It is necessary to deliver summary of researches with projects.

Geometry I

No. of Credit : 2
Type of Course : Theoretical and Practical
Prerequisite : Industrial Drawing I, Applied Mathematics I
Goals : introduction to rules of presenting 3D images;
Syllabus:

- Visual images: parallel and central (imagined and perspective image);
- Parallel and axial visual images: isometric, diametric, angular, types of angular images, shadows in parallel visual images, circles and curves;
- Central visual images: perspective, mono, dual and triple points, and their drawing method, measurement in perspective, circles and curves in central images, shadows in central images;
- It is necessary to perform short practices in all subjects;

Geometry II

No. of Credit : 2
Type of Course : Theoretical and Practical
Prerequisite : Applied Mathematics II, Industrial Drawing I
Goals : -
Syllabus:

- Principles of drawing geometry, showing point and types of lines and sheets, rotation method and change of sheet, determining real size of a line or a surface by using the rotation method or change of sheet;
- Using change of sheet in solving intervals (point to line or to sheet, line to line, etc);
- Different states of two lines to each other, types of sections (line with sheet, sheet with sheet, line to polygone);
- Definition of cylindrical, conical, rotary surface and section of line and plane with each surface;

- Section of cylindrical surface with each surface mentioned, section of rotary surfaces with each other;
- Developing volumes singly or in section state;
- Developing changes and transformation channels;
- Types of drawing methods and applications;
- Performing short practices in the mentioned subjects, offering maquette in models section;

Introduction to Art in History I

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : -
Goals : introduction of students to arts and works of arts in different countries and cultures, conceptions, origins and evolution of arts in these cultures in history and their comparison;
In this course, arts in Ancient Iran, Mesopotamia, Ancient Greece and Rome are taught.

Syllabus:
Explanation & Methodology:
Offering and comparing the relationship between culture and civilization, in one hand, and philosophical, human, social and economic issues, on the other hand, and their effect on art representations of each age and place. This comparison will be possible by offering representations and works of art of different cultures in a definite age and period, and their analysis.
This course will be offered by video and audio, and if possible, using photo, slide, film and visiting museums and collections.
At the end, students shall have ability to recognize works of arts of the mentioned cultures, discriminate belonging to each one and explain them, through which they are examined.

Introduction to Art in History II

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : Introduction to Art in History I
Goals : introduction of students to arts and works of arts in different countries and cultures, conceptions, origins and evolution of arts in these cultures in history and their comparison;
In this course, arts in India and Far East (China and Japan) are the subjects to be taught.

Syllabus (36 hours):
Explanation & Methodology:
Similar to the course of Introduction to Arts in History I;

Islamic Arts & Civilization

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : None
Goals : appearing holy religion of Islam and its distribution throughout the world have mainly effected on culture, civilization and objective representations of different countries of the distinctive historical and cultural backgrounds, calling them in the view of Governing Spirit and even in the methods as Unity.

Syllabus:
What Arabic-language Muslim or Persian and Turkish-language Muslim poet tells of distribution of Islamic sublime teachings, and what Iranian or Indian Muslim artistic and scientist leave as a memorial in Hijadh or elsewhere by breathing in an atmosphere full of scent of Islamic culture and civilization, either book or a structure or work of art or rhythmic poem or literary or mystical piece showing the flourish of common spirit of Islamic believes.
This common spirit and the links are those specifications and features generalizing Islamic World and imaging Islamic Culture & Civilization.
Undoubtedly, Islamic culture and civilization in all aspects from studies and arts to industries and skills are the main origins and bases of human civilization and pioneer of new sciences and skills, which shall be recognized, referred and used by Islamic countries and Muslims to disconnect the scientific and artistic links, and heart insurance of abilities, and its flourishing origins are used in the future foundations.

Explanation & Methodology:
Connected to Islamic studies and taught by relevant professors and through sessions of seminars, professors, guests, visiting works existing in museums, visiting buildings of Islamic periods, studying and visiting ancient and old scripts in state libraries, and if possible, team travel of students to Islamic countries to meet the objectives are performed in this course.
At the end, students of each group will present their teachings and researches performed by relevant advisor professor as a paper including necessary photos and plans, if possible.
The grade of this course shall be from collection of score of the mentioned paper and also the verbal test.
It is better to compile and publish the collection of researches and seminars in the form of press and book.

Human Resources Engineering (Ergonomics I)

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : None
Goals : introduction to principles and fundamentals of ergonomics and governing rules especially anthropometry;

Syllabus:
- Definition and introduction to duties and concept of ergonomics;
- Introduction to principles of work physiology and biomechanics;
- Introduction to principles and methods of its anthropometry;
- Introduction to principles of industrial psychology and sociology;

Applied Mathematics I

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : None
Goals : introduction to the concepts of applied mathematics for understanding technical courses and using them in projects;

Syllabus:

- Collection of integers, distance, brief introduction to compound numbers;
- Function and variable, primary definitions, application of linear functions in electricity and mechanics (Ohm law, linear springs), trigonometric functions of solving trigonometrics;
- Growing function and variable, function derivative, derivation orders, function and its derivatives;
- Derivative application;
- Curve slope, maximum and minimum issues, speed and acceleration, high rank derivatives and its application;
- Anti-derivative (initial function) and its orders, variable transformation techniques, part by part and fraction analysis;

Applied Mathematics II

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : Applied Mathematics I
Goals : introduction to the concepts of mathematics for understanding technical courses;

Syllabus:

1st Chapter:
Definite integral, sub-curve area, primary theorem of differential calculus, application of definite integral: extensive load of gravity center, inertia momentum, rotary volumes and logarithmic and exponential functions;
Introduction to differential equations and its application, 2nd Newton law;
Introduction to vectors and vector algebra, introduction to famous vectors in statics and dynamics (power, torque, speed);
Matrices, primary definitions, matrices algebra, determinant and adverse matrix, application of matrices in solving linear coordination system, Gauss method, rotation, reflection and transfer by help of matrix (in computer graphics);
2nd Chapter:
Statistics, theory of collections, example space, methods of offering statistical information, frequency distribution, frequency table information analysis, stochastic samples and sample distributions, estimation, calculating error, regression line;
Note that the 2nd chapter includes 3 out of 17 sessions of academic semester.

Physics I (Statics)

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : Applied Mathematics II
Goals : introduction to the concepts and conditions of objects statics for understanding courses of technical design and application of its principles in technical analysis of industrial design projects;

Syllabus:

- History of mechanics and its division;
- Primary concepts of statics and measurement dimensions and units, review on vectors and its types and vector algebra;
- Balance of matter particle, definition of matter particle, diagram of free body of particle, matter and equations, 2D balance;
- Equivalent forces system: definition of rigid object, concept of torque, displacement of force, extensive load;
- Concept of balance of rigid object, equations of balance of 2D rigid object, concept of definiteness and indefiniteness of statics, and indefiniteness grade;
- Analyzing plane truss including dual-force members;
- Concept of friction in static and dynamic state, issues of friction in sloped levels of bending;
- Turning point and mass center;
- Brief introduction to 3D statics and discussing some simple problems in this subject;
- Discussion in balance stability;
- Performing practical exercises as well as analyzing forces and studying static rules therein;

Physics II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Physics I
Goals : introduction to the concepts and primary concepts of dynamics for using it in technical analysis of industrial design projects;

Syllabus:

1D Motions: concept of straight motion, medium and moment speed, medium and moment acceleration, motion with fixed acceleration, free fall, relative movement;
2D Motion: concept of 2D (plane) motion of medium and moment acceleration, and throwing speed, motion in a circular way;
Work and Energy: definition of work, kinetics and potential energy;
Impact: concept of impact, linear momentum preservation law, elastic and inelastic impacts;
Rotation: angular speed and acceleration, rotation with fixed angular acceleration, relation of linear and angular accelerations and speeds, angular torque and acceleration, inertia momentum, angular momentum, introduction to gyroscope and its application;
Simple practical exercises of each subject are presented for better understanding of the mentioned subjects.

Physics III (Electricity and Optics)

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Applied Mathematics II
Goals : introduction to the subjects of electricity, optics and illumination;
Syllabus:
Electricity (1 credit):
Primary definitions, intensity of electrical direct current and voltage, Ohm law, series and parallel joints, electrical kinetics, electrical power, electrical work, alternative current and primary elements of electrical circuits, bobbin resistance, capacitor and behavior of each one in alternative current;
Introduction to types of transformers and their applications, introduction to types of electromotor (direct, single and triple phase alternative, synchrony and asynchrony, universal) and their applications;
Introduction to types of plugs, fuses, high pressure and weak cables;
Optics and illumination (1 credit):
Nature of light, light diameter, introduction to lenses and mirrors rules, light dispersion rules, illumination intensity, light intensity distribution, light dispersion curve, light resources of incandescent, mercury, metal, hide, and other lamps, introduction to illumination calculations, point by point method: intensity of illumination resulted from point resources, linear extensive resources, effect of reflecting levels;
Introduction to passage illumination: providing sufficient illumination in ways, regularity of roads illumination, preventing eyeing from light in roads, performing simple practical exercises in each three section at discretion of related professor by students;

Industrial Drawing I

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : -
Goals : introduction to the rules and concepts of industrial drawing by tools for showing industrial products;
Syllabus:

- History and definition of industrial drawing;
- Application of industrial drawing;
- Definition of image;
- Drawing image of point, line, introduction to image sheets, grade in different standards;
- Drawing types of image in 3D and 6D;
- Drawing tools and their application, dimensions of paper, line, frame, table;
- Geometrical drawings in industrial drawing;
- Writing size;
- Drawing image of an object by help of its known images (unknown finding and map reading);
- Shear and its type;
- Performing short practices in all subjects;

Industrial Drawing II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Industrial Drawing I
Goals : training complete drawing and reading industrial maps for using them in industrial design projects;
Syllabus:

- Drawing the implemented drawings, main sizes, shear in such drawings, method of reading implemented maps;
- Introduction to different standards;
- Writing industrial size, plate signs, methods of production and its effects on writing size;
- Types of screw and nuts, pin, springs, bearings, gears, primary definitions, and method of drawing the showing signs and their size writing;
- Tolerances and adjustments, tolerance groups in different standards, types of parts confusion;
- Introduction to CAD;
- Short practices in all subjects, and performing a project;

History of Industrial Drawing

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : Introduction to Art in History II
Goals : method of establishing industrial design and its developments and position of industrial design in growth of industrial projects up to now;
Syllabus:
Introduction to change of hand-made to machine industries and movements established for confirming both systems, studying effect of work divisions of machine in forming industrial design, analyzing different art views concerning the machine products, recognizing training centers of industrial design, recognizing status of industrial designers in Iranian industry;

Human Resources Engineering (Ergonomics) II

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : Human Resources Engineering (Ergonomics) I
Goals : introduction to dangerous environmental factors in relationship with industrial products and influence of factors and their control methods;
Syllabus:

- Studying dangerous physical factors including sound, optics, vibrations, changes of air pressure, changes of temperature, radiations;
- Studying dangerous chemical factors especially the materials with high general consumption;
- Studying dangerous biological factors especially in designing hospital equipment;
- The mentioned subjects are followed by the required research and practices;

Evaluation of Industrial Products

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Ergonomics I, Fundamentals of Industrial Design II
Goals : introduction to different methods of analysis and evaluation of industrial products;
Syllabus:

- Introduction to subjects discussed in analysis;
- Training different analysis methods;
- Training evaluation methods and assessment of industrial products (at least in 3 methods);
- Evaluation calculations method;
- Analysis, evaluation and assessment system so that it is applicable by a computer language;

The mentioned subjects shall be performed together with visiting the factories.

Objects Design in Islamic Civilization

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : None
Goals : introduction to the industrial objects and parts design and also introduction to design culture in Islamic civilization as a field for using special cultural specifications in design of working and living objects and instruments;
Syllabus:
This course is presented as lecture and research, and its subject includes all living tools and instruments, and equipment of different sciences, techniques and jobs in Islamic civilization.
In this course, students are guided to search in libraries, museums and other resources, and prepare sample and finally an evident report in a field selected of the objects.
For this purpose, students will use all capabilities in the field of design, drawing, photography, modeling, etc.
After collection of samples, the best one in form, material, function and other items will be analyzed, and compared to the similar samples in current industries.

Industrial Products Management and Economics

No. of Credit : 3
Type of Course : Theoretical
Prerequisite : None
Goals : introduction to the concepts of economics and market, and marketing the industrial goods and industrial management production issues;
Syllabus:
This course is taught in two chapters:
1st Chapter: Economics and Marketing

1- Definitions and generalities, relation of market issues and economics with industrial products designed, history of commerce;
2- Concepts of commercial economics: concepts of production, GNP, national income, price, economic factors, supply and demand, supply and demand curve and law, effective factors on supply and demand, demand curve flexibility;
3- Types of competition: monopoly, free, complete, imbalance;
4- Concepts of marketing: definition and history of marketing and retailers and wholesalers, producers, intermediate;
   - Types of marketing activities: nomenclature, packaging, transport, storing, distribution, competition, sales, sales progress, marketing studies;
   - Goods distribution: distribution method, selecting distribution ways, industrial products distribution organization;
   - Goods sale: sale organization, specifications of sale manager, consuming sale and industrial product, organizational communication of sale section with other sections, sale studies;
   - Advertisement: commercial and industrial advertisements, advertisement effects, period and methods and issues (definitions, applications, method of selection and equipment), notice (elements and their organization), issues related to advertisement of industrial products, advertising organizations, calculating advertisement costs;
   - After sale services for industrial and commercial products, market studies;
   - Issues related to new industrial products, nomenclature, competition, distribution issues, production, financial, advertisement and packaging, market study;
   - Market factors (relative combination, geographical status, user income distribution);
   - Motifs (personal, social and economic);
   - Purchase intention (primary and secondary needs, intention for future and seasonal and specific purchases);
   - Primary bases of request (industrial demand and final user);

Practical Section:

1- Preparing projects suitable with syllabuses similar to the analytical report concerning the current notices or providing industrial brochures;
2- Researching on economic analysis and market of an industrial product selected by student and confirmed by related professor;

2nd Chapter: Industrial Management

1- Definition and generalities of operating management, relation of production management with experts of industrial design;
2- Decision making: decision making process and models;
3- Prediction: different methods of prediction, the prediction error;
4- Locating or determining site of factory: effective factors on determining site of factory, processes of locating studies, operating systems locating models;
5- Designing settlement of machinery and workshops: settlement methods and models, designing assembly line and balancing the assembly line;
6- Inventory control: independent and dependent demand, duties of material management, inventory control system, safety reserve, order again, order cost, warehousing cost;
7- General planning in continuous production systems: goals and methods of general planning, drawing method in general planning, designing good program and different models;
8- Planning in non-continuous production systems: types of planning, planning for machinery and detailed items, sequence of orders performance;

9- Material planning: goals and types of material planning systems, calculating demand of product constituents;
10- Project planning: project planning models, network planning processes, determining time of project performance, determining risk resulted from effect of delay in project, and breakeven cost- time;
11- Quality control: definition and models of quality control, sampling methods and conditions of selection;

Practical:

1- Solving problems;
2- Referring to the factories and preparing projects suitable to the taught chapters;

Production Materials and Methods I (Wood)

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : None
Goals : introduction to the specifications of wood and its application in industries;
Syllabus:
Forest, center wood production, way of wood formation, anatomic structure of wood (wood anatomy);
Physiochemical, chemical and technological properties of wood, recognizing types of industrial woods and their application;
Designing types of wo̊ody joints, introduction to woody models;
Recognizing machine tools and manual instruments in wood industries;
Introduction to woody products technology (timber, fiber, multi-layer wood, coated, MDF, etc);
Theoretical findings shall be experienced according to the facilities in the form of visiting the industrial units, preparing report, film and practical works;

Production Materials and Methods II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : None
Goals : introduction to the specifications of metals and its application in industries;
Syllabus:

- Introduction to structure of metals and its types;
- General properties of metals (mechanical, physical and chemical);
- Introduction to instruments and related machinery;
- Metal forming methods (with or without swarfing): types of casting, forging, turning, powder metallurgy, sheeting, metallic joints (cold and hot);

Theoretical findings shall be experienced according to the facilities in the form of visiting the industrial units, preparing report, film and practical works;

Production Materials and Methods III

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : None
Goals : introduction to the specifications of plastic and its application in industries;
Syllabus:

- Introduction to structure of plastic and its types;
- General properties (physical and mechanical) of plastics;
- Introduction to the related tools and machinery;
- Introduction to the production methods in plastics: thermoplastics (vacuum, pneumatic, injection), thermostats (pressurized, transferring molds);
- Plastic joints;

Theoretical findings shall be experienced in practical workshops and visiting the industrial units is necessary;

Industrial Sociology

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : None
Goals : introduction to the industrial sociology;
Syllabus:

- Definition and subject of industrial sociology and history of work and industry sociology;
- Concept of work and processes of work value developments during the history and work processes in different periods of economic life (working in periods of food collection, manual and machine food production);
- Processes of development of work units in the history (work in domestic, rural, urban, national and international economic units);
- Processes of development of work regimes in the history (work in systems of domestic, slavery, guild, commercial and industrial investment economics);
- Industrial revolution and its effective factors (material and non-material factors);
- Production and work techniques in new society, the developments made due to production and work techniques in new society;
- Studying worker in new industry and rationalization of methodology (taylorism or work mechanical school, work and industry physiology and psychology and sociology schools);
- Effects of industrialism on society;
- Conditions of industrialism and future of industrial societies and theories of Wilbert Moore, new movement, return, continuity;

Computer-Aided Design

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Applied Mathematics II
Goals : providing capability of using computer hardware and software for design;
Syllabus:

1- Purpose of hardware;
2- Definitions of software;
- Programming languages;
- Operating system programs;
- Basic language;
3- Introduction to and working with design softwares;
4- Graphics in computer languages;
5- Introduction to analysis, modeling and calculation softwares;

The mentioned subjects shall be together with the practices and using all applications of design software for an industrial production.

Technical Design I

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Physics I
Goals : introduction to the strength of materials and behavior of materials influenced by forces under different conditions for correct selection of materials in industrial design projects;
Syllabus:

- Internal forces (shear and bending curve), definition of stress and buckling, experimental curve of stress and buckling, Hook law, heat effects;
- Tension and pressure;
- Twisting, twisting buckling, twisting angle in circular sections;
- Bending in simple beams, determining rates of stress in beams under bending load;
- Introduction to curving in columns and critical load;
- Concepts of stress concentration, final stress, delivery and fatigue stresses and safety coefficient;
- Performing short projects during this course as including all mentioned subjects;
- Visiting and performing some common tests of strength of materials during the course;

Technical Design II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Physics I
Goals : introduction to the strength of materials and behavior of materials influenced by powers under different conditions for correct selection of materials in industrial design projects;

Syllabus:

- Introduction to machine elements including screws, springs, gears and bearings, types and application of each one and their calculations in simple states;
- Types of permanent and semi-permanent joints including bosch, soldering, pin and temporary joints including screw and nut and application of both types of joint and their calculations in simple states;
- Introduction to types of fringing joints;
- Introduction to primary mechanisms of four- bar, momentum and sliding and drawing center, four-bar mechanism for two and three exact status;
- Introduction to cams, their type and application;
- Performing short projects for learning the taught items;

Technical Design III (Fundamentals of Hydraulics and Pneumatics)

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Technical Design II, Applied Mathematics II
Goals : introduction to the application of hydraulic and pneumatic systems in industrial equipment;

Syllabus:

Pressure of fluids (liquids and gases), principal rules governing the behavior of fluids, Pascal principle and its application, movable fluids, Bernoulli law, principal elements in hydraulic and pneumatic circuits, introduction to hydraulic and pneumatic valves, their types and application and signs, introduction to pumps and compressors, their types and application, jacks and their types;
Introduction to designing simple hydraulic and pneumatic circuits and their analysis;
Practicing design of some simple hydraulic and pneumatic circuits and its application in equipment;

Fundamentals of Industrial Design I

No. of Credit : 2
Type of Course : Theoretical
Prerequisite : History of Industrial Design
Goals : introduction to the subjects related to industrial design theoretically;

Syllabus:

- Definition of design;
- Definitions of industrial design from: - relation of human and production; - effect of different cultural, artistic and social factors; - study of communication factors of production and human;
- General classification of object and environment;
- Specific study of man-made products and industrial products from view of industrial design;
- Position of industrial design in different industries: recognition of classification and types of industrial projects in different factories, position of industrial design in types of project and duties of industrial design.

It is necessary to perform and present some researches on the mentioned subjects by students at discretion of professor.

Fundamentals of Industrial Design II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Fundamentals of Industrial Design I, Form and Space, Basic Design Workshop I
Goals : introduction to the human sensational subjects theoretically with industrial products and application of findings of prerequisite courses;

Syllabus:

- Sensational relation of human to industrial products and studying its reasons;
- Studying relation of different human senses and industrial products, its related feedbacks and responses;
- Studying different functions of industrial products and determining their better values;
- Offering a new design based on the mentioned teachings;

All subjects will be performed with research and practical exercises.

Industrial Design Project I

No. of Credit : 4
Type of Course : Theoretical & Practical
Prerequisite : Fundamentals of Industrial Design II, Ergonomics II, Technical Design II, Modeling II, Basic Design II
Goals : intellectual growth of students in application of findings of prerequisite courses and learning theoretical and practical execution of industrial design projects according to the user's requirements;

Syllabus:

Necessary items in classification of different processes of amending plans:

- Training and using theories concerning the project of industrial design: troubleshooting, data collection, data analysis and preparing list of shalls (first step);

Necessary items for amending plans:

- Different methods of idea presentation in the form of general plans (second step);
- Way of studying plans presented and selecting the best plan through evaluation (third step);
- Developing selected plan according to the design documents;
- Justifying and confirming the selected plan according to the list of shalls (fourth step);

The mentioned steps will be performed during semester in the form of a project by student by offering problem solution in the form of maquette, drawing, etc;

Industrial Design Project II

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project I, Geometry, Production Materials and Methods III
Goals : theoretical familiarity with principles and rules of designing the package of industrial products;

Syllabus:

This course is divided into two subjects of graphics and packaging technique, and student will study some problems in the field of packaging industrial products according to familiarity with work procedure of projects.
Graphics: definition of packaging, history of packaging, review on packaging in nature;
Duties of package: protecting product in terms of maintenance, reservation, store and transportation;
Advertisement;
Information communication;
Relation of package design and product design;
Role of form, color, signs and letters in packaging;
Technical section:
Packaging materials: paper, paperboard, wood, glass, plastic, metal, etc;
Production of closed container, preparing elements of closed container, cut, pinch, etc;
Joints, glue, welding, heat methods, mechanical packages (screw and nut, etc), forming the closed container;
Filling closed container: countable products, dry materials, fluid materials;
Closing container: cartons, compressed fits, winding doors, great and small bags;
Installing signs and labels: closing test methods;

Industrial Design Project III

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Ergonomics II
Goals : providing capability of using ergonomic factors in designing the industrial products;

Syllabus:

- Method of designing manual instruments;
- Method of designing work positions;
- Method of designing some home appliances;
- Method of designing some industrial machinery;
- Introduction to principles and methods of protection and safety;

The mentioned subjects shall be performed by short practical exercises.

Industrial Design Project IV

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project I
Goals : growing students' innovation in presenting good fast and innovative solutions;
Syllabus:

- Introduction to creativity process;
- Introduction to personal and organizational creativity obstacles;
- Training the methods of reinforcing creativity in the form of different techniques in creativity;
- Performing short practices according to the learned methods;

These practices shall include simple content but with various and innovative subject.
The practices shall be presented by students in a good understandable manner (in 2D or 3D presentation if professor deems fit).

Industrial Design Project V

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project I
Goals : introduction to subjects of psychology and its application according to the industrial products in environment;
Syllabus:

- Fundamentals of psychology;
- Social and industrial psychology;
- Environmental psychology;
- Recognition of environmental psychology and industrial products according to the following items:
  - Relation of designing industrial products with environment;
  - Relation of design with human behaviors;
  - Relation of industrial products and materials with design, environment and human;
  - Studying effect of visual elements of environment on industrial products;

The mentioned subjects will be performed with specialized seminars, theoretical and practical projects.
After theoretical subjects, the mentioned items will be presented in the form of a project including the studying then designing processes.

Industrial Design Project VI

No. of Credit : 3
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project II
Goals : reinforcing creativity for solving industrial problems with regard to the technological facilities and culture and social issues in present and future;
Syllabus:

This course shall include the study of a problem in present and future conditions, and the execution of project processes of industrial design thereon. Preparing report and performing necessary details and selecting the idea preparation and industrial drawings and producing maquette and presenting it for present subject are necessary. In the section of future, preparing report of the same subject in the future condition of society and presentation of detail and presentation and reasoning the selected plan is necessary, and reaching a good plan is considerably important.

Industrial Design Project VII

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project I or co-requisite
Goals : introduction to specifications of environmental elements and their design deemed generally as furniture;
Syllabus:

- Definitions and concepts of related words;
- Historical study of furniture briefly;
- Furniture and related spaces and studying effective and effected factors;
- Introduction to techniques of furniture production and performing a project in the mentioned unit;
- Visiting workshops during the semester;

Industrial Design Project VIII

No. of Credit : 2
Type of Course : Theoretical & Practical
Prerequisite : Industrial Design Project I
Goals : introduction to the design biotic science and its application in designing industrial products;
Syllabus:

- Introduction to bionic design and role and capabilities of related specialists;
- Recognizing formic and functional relation of creatures in nature (plants, animals, architecture of animals);
- Studying special functions of each subject mentioned and using them in the current industry;
- Performing research works in practical fields and presenting idea by using its results in designing industrial products;

Industrial Design Project IX

No. of Credit : 5
Type of Course : Theoretical & Practical
Prerequisite : All Industrial Design Projects
Goals : developing students' ability for adjustment of academic findings with visual conditions of Iranian factories and local industries;

Syllabus:

- Selecting project subject of internal industries and performing necessary researches with direct cooperation and collaboration of specialists of factory and field;
- Judging and exchanging idea of specialists of factory and professors in different project processes;
- Executing result of project as model or pre-model according to the facilities of related factory;
- Final judgment by beneficiary professors and specialists;

Note: the activity and cooperation of students shall be informed per month as written report from factory to faculty.

Thesis (Theoretical)

No. of Credit : 3
Type of Course : Theoretical
Prerequisite : All Credits of Bachelor's Degree
Goals : evaluating the students' ability in recognizing the researches carried out for recognition and theoretical solution of selected subject;

Syllabus:

The subject of thesis will be selected by students and accepted by council of professors among the industrial issues of Islamic society.

Notes:

1- Advisor professors of thesis shall be industrial design specialists, and other non-industrial design specialist professors may undertake the thesis guidance in the form of consultation;
2- The time of performing thesis researches is 1-2 academic semesters;

Thesis (Practical)

No. of Credit : 3
Type of Course : Theoretical
Prerequisite : All Credits of Bachelor's Degree
Goals : evaluating the students' ability in using the results of thesis researches and using them in execution of practical works and presentation of problem solution;

Syllabus:

Executive results of plan shall be related to the thesis researches, and each section shows theoretical use in practical work.

This section includes all documents required and industrial drawings, maquette and model and images for confirming and reasoning authenticity of plan suggested.

The items mentioned in note of thesis shall be observed.

Training

Training course is divided into two sections:

6- General Section (Training I): this section includes the general familiarity and working with industrial machinery in the sections of metal and plastic which shall be passed in summer between the 2nd and 3rd semesters. In this section, students have right to select the factory by confirmation of related professor;

7- Specialized Section (Training II): in this section, students will get familiar with their future workplace, attend the design office of related factory, participate in the design group for performing the industrial projects and undergo the specialized training in terms of industrial design;