Course Description

Department of Industrial Engineering

[Grade 1,2] Freshman, Sophomore

Advisor Counsel			
Yr. : 1,2,3,4	Sem. : 1,2	Course Code: IG0002	0-0-0-0
Faculties in Abeek program guide overall undergraduate students using continuous counseling which covers from educational aspects such as Abeek program objectives, courses' performances to various university life such as job planning, friendship and other issues.			
Work System and Process Management			
Yr. : 1	Sem. : 2	Course Code: IG0003	2-2-0-0
This course covers the concepts and techniques of designing and improving work performance and productivity of man and man-machine systems. Topics include: productivity, methods study, value analysis, motion economy and analysis, work measurements, job analysis and evaluation, wage payments plan, etc. Laboratory work is also included.			
Introduction to Industrial Design			
Yr. : 1	Sem. : 1	Course Code: IG0027	2-2-0-0
Industrial Design is a professional field that is closely related to sociology, new technology, economics, environmental engineering, aesthetics, philosophy, psychology and art. The purpose is to create high added-values through integrating functional properties and emotional aspects into industrial products, which fulfills the expectation of consumers.			
Manufacturing System Engineering			
Yr. : 2	Sem. : 1	Course Code: IG0005	3-3-0-0
This lecture is concerning about computer aided automatic manufacturing including FMS, CAPP, CIM, GY and MRP.			
Elementary Engineering Design			
Yr. : 2	Sem. : 1	Course Code: IG0006	3-3-0-0
Basic tools needed for engineering design is discussed. Systematic solution approaches for a variety of problems that occur during the design process of engineered system is introduced. Team projects are given to help students develop an ability to collaborate with a group. The main contents include: the			

concept of engineering design, phases in engineering design, team work, basic TRIZ concepts, writing design optimization report, and engineering ethics.

Human Factors and Ergonomics

Yr. : 2	Sem. : 1	Course Code: IG0028	3-2-1-0

The basic theory of human characteristics, performance, capacity and limit functions and the designing process are studied in order to achieve the effective design, control and evaluation of the overall system of man-machine-environment.

Information Technology & Service Management

Yr. : 2	Sem. : 1	Course Code: IG0008	3-3-0-0

This course will introduce the concepts and techniques for manipulating information in business and industry. Focus will be given on the fundamental concepts and theories of information technology based on information systems, including business service and implementation using business process reengineering. The theories include IT concept, processes, performance indices, factors, systems and methodologies.

Industrial Statistics

Yr. : 2	Sem. : 1	Course Code: IG0009	2-2-0-0

This course teaches several statistical estimation and test theories and methods using the understanding of the population and samples. As a succeeding course of "Introduction to Statistics", it introduces Student t-distribution, chi-square distribution, F-distribution and so on. In addition, it handles various estimation and testing methods for Population's mean, proportions and variance with the usage of commercial statistical software, Minitab.

CAD and Practice

Yr. : 2	Sem. : 1	Course Code: IG0010	3-3-0-0

This course is an introductory course to learn how to present a 2D drawing on computer. It includes learning about the concept of CAD dimensions and how to get skills to model the object accurately.

Production/Operations Management

Yr. : 2	Sem. : 2	Course Code: IG0012	3-3-0-0

The production/operations management is a function for operating production systems efficiently by coordinating the use of workers, machinery and materials. Operations manager must make decisions such that productivity of production system is maximized and the manufacturing cost per unit produced is minimized. In this class, we will study methodology or techniques for analysis and control of the production system with the above points in mind. A few cases regarding the subject matters will be discussed in class.

Embedded System Programming

Yr. : 2	Sem. : 2	Course Code: IG0029	3-3-0-0

Embedded System Programming is the course for learning various computer programming knowledge which are needed for building many applications and systems in industrial engineering fields. It includes synchronizing skill, thread control, UI / Computer Graphics, Web system and interfaces with other platforms. The applications and systems are constructed using general programming languages such as Java/C++/C#/Matlab.

Mechanical Drawing and Tolerance Analysis

Yr. : 2	Sem. : 2	Course Code: IG0015	3-3-0-0

This lecture is concerning about engineering drawing. Especially we discuss the method of different interpretation of engineering drawing between traditional coordinate tolerancing system and geometric dimensioning and tolerancing system. Also we discuss the method of tolerance analysis which is the most important factor to make engineering drawing.

Data Analysis

Yr. : 2	Sem. : 2	Course Code: IG0013	3-3-0-0

Following the **_Elementary Statistics_**, this lecture is concerned about the analysis method for logical decision making. It deals with the test hypothesis for mean, proportion and variance, and also analysis of variance, regression, goodness of fit test and sampling inspection. Class material includes Minitab S/W.

Industrial Economics

Yr. : 2	Sem. : 2	Course Code: IG0016	3-3-0-0

The course reviews theories of consumer, producer, markets, advertisement, games, strategies, asymmetric information, environmental economics, political economy and related developmental economics with a special emphasis on pricing and strategies of firms.

Theory of Inventive Problem Solving

Yr. : 2	Sem. : 2	Course Code: IG0017	3-1-2-0

The classical/modern TRIZ is discussed. TRIZ is an inventive problem-solving method for technical problems using principles patented mainly by Russia. The goal of TRIZ is to find the conceptual solution that solves the problem's inherent contradiction using minimal resources. Along with 6-sigma methodology, TRIZ has been getting a grave attention in increasing the efficiency of a product improvement/development process.

Department of Industrial & Management Engineering

[Grade 3,4] Junior, Senior

Advisor Counsel			
Yr. : 1,2,3,4	Sem. : 1,2	Course Code: IG0002	0-0-0-0
Faculties in Abeek program guide overall undergraduate students using continuous counseling which covers from educational aspects such as Abeek program objectives, courses' performances to various university life such as job planning, friendship and other issues.			
Operations Research			
Yr. : 3	Sem. : 1	Course Code: IG3001	3-3-0-0
This course introduces the concepts and applications of Operations Research. We will mainly deal with deterministic models. OR is mainly concerned with using mathematical models to solve the problems arising in operation, design and evaluation of economic and/or social systems. We will cover basic deterministic models, linear programming, simplex method, sensitivity analysis, duality theory and their algorithms.			
Statistical Quality Control and Lab.			
Yr. : 3	Sem. : 1	Course Code: IG3002	3-2-0-2
The study focuses on sampling inspection and control chart started by Dodge, Romig, Shewhart in 1920's. Especially This lecture will consider control-in concept in SPC(statistical process control) with spec-in.			
Introduction to Technology Management			
Yr. : 3	Sem. : 1	Course Code: IG3003	3-3-0-0
The course reviews theories of technology and innovation, measurements thereof, patents, collaborations, and cluster policies. Also included are topics of pricing policies of technology firms, R&D strategies, STEM worker policy, cases, knowledge and technology diffusion and transfer values.			
Design planning and strategy			
Yr. : 3	Sem. : 1	Course Code: IG3004	3-3-0-0
This course aims students to understand the technology and market comprehensively and lead the concept of the products and services that can be commercialized. In commercializing the technology, students perform a series of steps to plan the products and to suggest the strategic direction by design research methodology.			

Manufacturing Logistics System Management

Yr. : 3	Sem. : 1	Course Code: IG3005	3-1-2-0

Analytical treatment of facilities location, physical layout, material flow and handling, combined with heuristic algorithms to assist in the design of production/service facilities; fundamental concepts applied through a sequence of design projects.

Production Planning and Control

Yr. : 3	Sem. : 1	Course Code: IG3006	3-1-2-0

This course provide knowledge needed in making decisions about what is to be produced, how much and when. Topics including inventory management, materials management, scheduling, production activity control, JIT, TOC will be covered in class.

Reliability Engineering

Yr. : 3	Sem. : 2	Course Code: IG3007	3-3-0-0

The statistical/technical methodology for high-reliability product design is discussed. Main issues include reliability measures, life distribution, reliability tests, accelerated life test, HALT/HASS.

System Simulation and Applications

Yr. : 3	Sem. : 2	Course Code: IG3008	3-3-0-0

Systems simulation structure, logic and methodologies; generation of random numbers and deviates; system simulation languages, models and analysis; applications to industrial situations. In-depth study into the design-modeling and subsequent analysis of contemporary production/service systems; factory/service systems are modeled using the ARENA language; emphasis is placed on the critical analysis of alternative flow designs of modeled systems using flow and economic parameters to assess system improvement.

Decision-Making Analysis

Yr. : 3	Sem. : 2	Course Code: IG3009	3-1-2-0

The main issue of this course is the optimal decision making. We are faced with various kinds of decision making problems in management of an organization or engineering design. In most of real-world problems, there are many different ways to solve a given problem. This course insists that we should choose the one which is the best or optimal among all possible ones. We will cover transportation, network optimization, dynamic programming, game theory, markov chains, data envelopment analysis and analytic hierarchy process.

Design of Experiments

Yr. : 3	Sem. : 2	Course Code: IG3010	3-1-2-0

Design of Experiments is the statistical design of any information-gathering exercises where variation is present. This lecture is to learn the methodology about how to get the less number of experiments to save time and cost. Class material includes Minitab S/W.

Quality Management System Design			
Yr. : 3	Sem. : 2	Course Code: IG3011	3-1-2-0

How to measure and analysis "customer's needs" in market, and how to link the production process including core competence, design of product and process. We will study these theses mentioned above.

Cost Engineering			
Yr. : 3	Sem. : 2	Course Code: IG3012	3-3-0-0

Costing techniques applicable in manufacturing enterprises will be covered in this course. Some of the basic subject that students will learn include basic concept of cost accounting (revenues, expenses, assets, liabilities, income statement, balance sheet, and statement of cash flows), financial versus operational performance measures, activity based costing, life cycle costing, throughput accounting (theory of constraints), cost of quality, economic value added.

Engineering Psychology			
Yr. : 4	Sem. : 1	Course Code: IG3013	3-3-0-0

This lectures offers the cognitively oriented principles and technologies to design, analyze and evaluate the complex human machine system involving the integration of system operational process and human perceptual and cognitive characteristics such as situation awareness, memory, language communication, decision making and problem solving. The human machine system engineering principles and theories would be verified through cognitive engineering experiment with computer software and human performance modeling.

Engineering Technology and Intellectual Property			
Yr. : 4	Sem. : 1	Course Code: IG3014	3-3-0-0

This course treats the basic knowledge for patent application which stems from the innovative problem-solving methodology. And an algorithmic process for innovative technical problem-solving is also discussed.

Six Sigma			
Yr. : 4	Sem. : 1	Course Code: IG3015	3-3-0-0

This lecture is about the statistical methodology to deduce the information from data. It deals with the set(collection), organization, and interpretation of data, and also probability, distribution function and estimation. Class material includes Minitab S/W.

Human Resource Management			
Yr. : 4	Sem. : 1	Course Code: IG3016	3-3-0-0

The course reviews basic theories of labor markets, labor relations, organizations, human capital, human resource development along with related cases and benchmarks.

Capstone Design			

Yr. : 4	Sem. : 1	Course Code: IG3017	2-0-2-0

Capstone Design 1 is an advanced engineering course, where senior engineering students select a design target and implement it through analyzing data, designing experiments and generating ideas based on various creative engineering methodologies. In a special case, a design target may be given by an advisor. At an initial stage, an detail research plan is presented after surveying literatures, modeling processes and fixing roles / responsibilities of design team members. Then, engineering design activities or experiments are performed. Finally, the final design output is presented with analyzed engineering results and conclusions. Overall design processes are performed by an organized engineering team and the design output is evaluated on a basis of each team. During the project, each senior student achieves the goal with communicating and cooperating with the other team members.

Strategic Management of Technology

Yr. : 4	Sem. : 2	Course Code: IG3018	3-3-0-0

Strategic Management of Technology course provides students with an understanding of quantitative methods and their application to management problems. Its main topics include production planning, inventory control, network and monte-carlo simulation and decision making. Two main purposes of this courses are 1) introduce the application and limitations of quantitative methods in management; and 2) develop ability to mathematically model problem situations and to interpret results of algorithmic solutions to the models.

Industrial Standardization

Yr. : 4	Sem. : 2	Course Code: IG3019	3-3-0-0

The Standard is a basic factor on Quality Management including 6σ-SPC. Throughout all industries, Standardization is really important. The keynote is how to select and manage The Standard.

Occupational Safety Management and Engineering

Yr. : 4	Sem. : 2	Course Code: IG3020	3-3-0-0

This course deals with the minimization of accidents in the work place, effective handling of accidents, safety management of the causes, and the methodology of the engineering-oriented analysis.

Business Process Management

Yr. : 4	Sem. : 2	Course Code: IG3021	3-3-0-0

This course overcomes the limitations of the existing Business Process Reengineering (BPR) and portfolio strategies of information systems. It introduces process automation techniques and several optimization methods for enhancing enterprises' agilities. In addition, various management methods are introduced including quantitative measurement of business performances and process controls.

Energy Systems Optimization

Yr. : 4	Sem. : 2	Course Code:IG3022	3-3-0-0

Energy System Optimization course handles various algorithms and techniques for optimizing systems

with several energy resources such as photovoltaic energy and wind power energy resources. This course covers how to model an optimized energy system with conventional energy resources and new renewable energy resources - the Smart Grid methods which is used for supplying electricity effectively. In addition, various artificial intelligence techniques and nonlinear control techniques are introduced.

Department of Engineering Design

[Grade 3,4] Junior, Senior

Advisor Counsel			
Yr. : 1,2,3,4	Sem. : 1,2	Course Code: IG0002	0-0-0-0
Faculties in Abeek program guide overall undergraduate students using continuous counseling which covers from educational aspects such as Abeek program objectives, courses' performances to various university life such as job planning, friendship and other issues.			
Design planning and strategy			
Yr. : 3	Sem. : 1	Course Code : IG2023	3-3-0-0
This course aims students to understand the technology and market comprehensively and lead the concept of the products and services that can be commercialized. In commercializing the technology, students perform a series of steps to plan the products and to suggest the strategic direction by design research methodology.			
Advanced 3D Modeling			
Yr. : 3	Sem. : 1	Course Code : IG2008	3-3-0-0
This course introduces theories and practices of computer aided design (CAD) and virtual reality (VR). As core theories, NURBS representation, surface transformation and 3D reconstruction techniques are handled. This course supports the knowledge of solid modeling, which most CAD software have. In addition, it contributes to simulations and engineering skills using CAD and VR theories.			
Human Computer Interaction			
Yr. : 3	Sem. : 1	Course Code : IG2003	3-3-0-0
This course offers the state of art technology to understand the underlying philosophy and technique of interaction design for the design of hardware and software of interactive computer systems, and to explore the theories and the essential techniques for interaction design through practical design projects. Students learn prototyping techniques for designing interactive digital products. This course also serves as an introductory course of tangible media and interaction.			
Prototyping			
Yr. : 3	Sem. : 1	Course Code : IG2024	3-2-0-2
Class of Prototyping is engineering design project. During the class students will make models for interim and final check.			

Product and Mechanical Modeling

Yr. : 3	Sem. : 1	Course Code : IG2025	3-2-1-0

This course introduces various product design and mechanical modeling methods. Contemporary product design and mechanical modeling require a 3D model with highly accurate and precise dimensions and tolerances, satisfying intended functions, Design for manufacturing, Design for Engineering, allowable intensities, and economical criteria. In order to achieve these objectives, this course introduces modeling and mechanical design knowledge with various manufacturing process operations such as Injections, Molding, Die casting, Press, Numerical Control and other post-processing operations.

Computer Aided Engineering

Yr. : 3	Sem. : 1	Course Code : IG2015	3-2-1-0

Based on three dimensional (3D) modeling techniques, Computer Aided Engineering (CAE) handles how to integrate product design knowledge and engineering design processes. And, overall design and engineering / analyzing methods are covered including product/system architecture design, layout of components and assembly. Using CAE tools, students can learn CAE knowledge, and implement them through various practical engineering example in real industry.

Product design

Yr. : 3	Sem. : 2	Course Code : IG2026	3-2-0-2

In this course, students learn the design process to solve the problems creatively with practice and theory. Students perform a series of product design process like design analysis and interpretation of the issues which is based on human, environment and technology, and also deriving ideas, proposing solutions, making mock-ups and presentation.

Design Engineering Psychology

Yr. : 3	Sem. : 2	Course Code : IG2009	3-3-0-0

This lecture offers cognitive oriented systems design theories and methodologies for designing and evaluation of the product design and system design considering human(users and system designer) perceptual and cognitive characteristics.

Research Methods

Yr. : 3	Sem. : 2	Course Code : IG2011	3-3-0-0

The statistical and psychophysical research methods are introduced to analyze and interpret the results from experiments where people involved as subjects. Study how to deal with subjective differences and nonparametric data.

Sustainable Design

Yr. : 3	Sem. : 2	Course Code : IG2012	3-2-1-0

This course offers design philosophy and the state of art for Corporate Social Responsibility(CSR) and Creating Shared Value(CSV) through the appropriate technology to provide engineering designer with social, environmental and economic aspects. Student will learn the human centered and ecological oriented design technique such as green design or eco.

Service Design			
Yr. : 3	Sem. : 2	Course Code : IG2005	3-2-0-2

This class will be about the services applied to service industry's design and products. The goal is to strengthen the ability of convergence thinking due to the rapid growth of today's service industry. Learning and experiencing service design methodology based on human-centered thinking is important. Main contents include problem solving and idea generation through understanding, learning methodologies, and researching about service design.

Axiomatic and Optimal Design			
Yr. : 3	Sem. : 2	Course Code : IG2027	3-3-0-0

This course introduces theoretical and practical framework which resolve various engineering problem and issues in contemporary design and manufacturing. Axiomatic design handles the definition of various axioms, customers' function and requirement, design parameter control and extractions. Optimal design introduces linear and nonlinear optimization, artificial intelligence, meta-heuristics and other optimization methods. This course integrates the existing engineering issues and resolutions and contributes to generations of more desirable designs and modeling.

Capstone Design I			
Yr. : 4	Sem. : 1	Course Code : IG2014	2-0-2-0

This class is to improve overall ability of design development; which is generating creative design solution, suggesting elicited solution, and resulting physical shape through engineering plan process as final.

Cognitive System Design			
Yr. : 4	Sem. : 1	Course Code : IG2016	3-3-0-0

This lecture offers the product and system design process and technology for the complex human machine system involving the integration of system configuration and visualization of abstract informations by means of Work Domain Analysis and Abstraction Hierarchy used for Ecological Interface Design.

Product Lifecycle Management			
Yr. : 4	Sem. : 1	Course Code : IG2018	3-3-0-0

In this class students may learn what is managing product lifecycle that stars from needs to concept establishment, research and development, mapping, production, distribution, technical support, and abolition etc. the objective of this course is teaching process and system based on principles of Product

Lifecycle Management (PLM).

Digital Manufacturing

Yr. : 4	Sem. : 1	Course Code : IG2013	3-3-0-0

Digital Manufacturing covers not only knowledge for constructing various manufacturing and production systems in virtual space, but also simulation methodologies using the constructed virtual systems. Using digital manufacturing system and through its simulations, overall industrial engineering methodologies such as man-machine system management, production control, quality control and process control are learned and tested.

CMF design

Yr. : 4	Sem. : 1	Course Code : IG2028	3-3-0-0

This course introduces CMF(Color, Material and Finishing) with it's application and information as specific tools for design innovation by theory and examples. Students learn about cost reduction, process shrink, marketing and brand value through CMF design thinking and process as a representative activity of design engineering.

Design Portfolio

Yr. : 4	Sem. : 2	Course Code : IG2019	3-1-2-0

In this course, by organizing clearly all series of design works done, students produce a portfolio which can show their design ability effectively. Through various effects and techniques as using and editing color, layout and multimedia, students can express themselves.

Capstone DesignⅡ

Yr. : 4	Sem. : 2	Course Code : IG2020	2-0-2-0

In class of Capstone DesignⅡ, based on elicited solution from course Capstone Design Ⅰ.Students make result of finished product for graduate exhibition. Students express their design process, design solution, structure of product, or engineering interpretation through various visual media.

Design Management

Yr. : 4	Sem. : 2	Course Code : IG2021	3-3-0-0

This course is an introduction to industrial management for industrial design. It includes theories and cases of engineering economy, product management, technology management, group organization and industrial strategies.

Universal Design

Yr. : 4	Sem. : 2	Course Code : IG2022	3-3-0-0

This course provides an introduction to the concept, principles and case studies of Universal Design that accommodate the widest range of potential users, including people with mobility and visual impairments and/or other special needs.

Product Service System Design			
Yr. : 4	Sem. : 2	Course Code : IG2029	3-2-0-2
This course provides an expanded concept of design that treats not only product but also service, and derive customer's hidden needs and solution from a integrated viewpoint of product and service.			