



UNIVERSITAS  
ISLAM  
INDONESIA

# Academic Guidebook

**International Program**  
Department of Industrial Engineering  
Faculty of Industrial Technology  
Universitas Islam Indonesia  
2020/2021



VALUES | INNOVATION | PERFECTION  
[industrial.uii.ac.id/internasional](http://industrial.uii.ac.id/internasional)



## Faculty of Industrial Technology

### Vision

To be an excellent faculty in developing future-oriented human resources with commitment for transformation and development in technology, to be professional in providing the education, research and community service under the characters of *khairu ummah*.

### Mission

1. To embody an institution that actively involves in dakwah Islamiyah as ruled by Al-Qur'an and Al-Hadits, in the field of education, science and technology, a place to nurture an ulil albab individual that could showcase himself as a khairu ummah.
2. To carry out a teaching and learning system with the support of information technology and communication in the framework of modern higher education that oriented to science and technology, and commitment to the implementation of various instruments in providing qualified education.
3. To nurture excellence human resources by the enhancement of research quality and community service under the distinguish technology innovation and creativity of knowledge empowerment with proper basic capability, that oriented to providing benefits to community and to become main prime mover of economic growth and people's welfare.
4. To produce excellent graduates in attitude and behaviour that could actively involve in community as well as to compete globally.
5. To perform higher education activities under principles of good governance; equity, transparency, accountability and responsibility.

### Organizational Culture

Organizational culture is established under the philosophy of FAST. FAST literally means as immediate that also refers to dynamics. But above all, FAST is developed based on the prophetic characters, as follows:

- *Fathonah* (smart, competent and innovative)
- *Amanah* (impartiality, commitment)
- *Shiddiq* (honest, transparent and accountable)
- *Tabliqh* (communicative and open-minded)





## Organizational Structure 2018-2022

### Dean Office

Dean	: Prof. Dr. Ir. Hari Purnomo, M.T.
Vice Dean 1	: Dwi Ana Ratna Wati, S.T., M.Eng.
Vice Dean 2	: Dr. R.M. Sisdarmanto Adinandra, S.T., M.Sc.

### Department of Industrial Engineering

Head of Department	: M. Ridwan Andi Purnomo, S.T., M.Sc. Ph.D.
Secretary of Department	: M. Ragil Suryoputro, S.T., M.Sc.

### Undergraduate Program in Industrial Engineering

Head of Undergraduate Program	: Dr. Taufiq Immawan, ST., MM.
Secretary (Undergraduate Program)	: Sri Indrawati, ST., M.Eng.
Secretary (International Undergraduate Program)	: Ir. Ira Promasanti, M.Sc.

### Head of Division

Academic Administration	: Edi Haryono
General Affairs	: Ervin Yulianita Indriyani, ST.
Financial	: Masirah, A.Md.
Information Technology	: Rahmat Miftahul Habib, S.Kom.

### Head of Laboratory

Integrated Manufacturing System	: Abdullah 'Azzam, ST., MT.
Works System Design and Ergonomics	: Atyanti Dyah Prabaswari, ST., M.Sc.
Industrial Statistics and Optimization M.Sc	: Annisa Uswatun K., S.T., M.BA., M.Sc
Modelling and Industrial Simulation	: Vembri Noor Helia, S.T., M.T.
Enterprise Resource Planning	: Danang Setiawan, ST., MT.
Innovation and Organizational Development	: Wahyudi Sutrisno, ST., MT., MM.

## Faculty's Unit

### Management Information System

Management Information System in FIT is a unit of computer technician with certain obligation to support educational activities, research and community service as well as Islamic coaching with following main tasks:

- a. To establish coaching and practices objected to lecturers and administrative employees to improve their ability and knowledge in information technology and communication.
- b. To assist Board of Information System in establishing management information system that covers the establishment of software and hardware, university-level automation, as well maintaining good coordination with Board of Information System in its association with the design and development of university's automation in terms of management, academics, facilities and infrastructure.
- c. To coordinate the requirements of software from faculty and units
- d. To facilitate faculty with hardware and software in supporting day-to-day activities.
- e. To maintain the smooth internet connection for all stakeholders in faculty.
- f. To conduct routine websites maintenance.

### TEKNOIN Journal

This journal is initiated to disseminate all topics related to Industrial Technology. The journal accepts all researches concerning to science development and applied science. TEKNOIN journal is registered with ISSN serial number of 05838697. It publishes four times a month, on March, June, September and December. Furthermore, this journal has been accredited by Directorate General of Higher Education under Decree Letter No. 52/Dikti/Kep/2002.

### Quality System Assurance

Quality System Controller is a faculty-level independent unit that represents Board of Quality Assurance UII. This unit is established to support and supervise the faculty management in implementing UII quality standards that are interpreted through MERCY OF GOD, hence the service quality to consumers could be sustainably improved. Faculty of Industrial Technology has its quality plan that consists of quality elements that should be fulfilled as the elaboration of UII vision and mission.



## Facility

### ❖ Health Service

Unisia Polifarma polyclinic serves all academicians with health services. It is situated on the east side of Ulil Albab mosque and provides on-scheduled doctors who are ready to treat students, lecturers and public. This clinic also facilitated with 24-hours pharmacy.

### ❖ Main Building

Teaching and learning process in Faculty of Industrial Technology UII is located in Building Unit III and Unit XII that facilitated with proper facilities and infrastructure, such as classrooms, office complex, study centre, auditorium, audio-visual, prayer room, hall, canteen, study room and parks.

### ❖ Sport Facilities

Faculty of Industrial Technology is equipped with several sport facilities, such as soccer, basketball, volley and tennis. Soccer field is situated 200 metres away, on the east side of FIT, on the south of D-3 FE UII complex, to exact. Indoor sport arena is located near by the FIT building could be used as field, futsal, basketball and volleyball. Tennis court is located 500 metres away on the east side of FIT building (on the south side of Ulil Albab mosque). These facilities could be utilized by lecturers, students and employees of UII, free of charge.

### ❖ Parking Facilities

Parking facility could facilitate 800 motorcycles and 150 cars to accommodate vehicles of lecturers, employees and students. The parking facility for motorcycle is located on the east side of FIT building while parking facility for cars is located on the north side of building. Under regular shift arrangement, 20 operators are employed for safety purposes.

### ❖ Internet Connection

FIT UII is accommodated with VSAT antenna that connects it to global internet network by satellite. Connected wirelessly by using Wi-Fi, students directly are granted with fast and smooth internet connection. In several strategic spots, FIT also serves students with information technology services that include UII Connect, Eduroam, UII Print (Print, Scan and Copy), Klasiber E-Learning, Google Classroom, Google Edu, Online letter, official email and IT Support.

## Student Activities

FIT facilitates students with several student's organizations, both curricular and extracurricular. These students' organizations are designated to accommodate students with alternative activities to actualize their talent and interest, as a medium to train their organizational skill, managerial and working in team and society. The students' organizations that developed by FIT are Board of Students' Representative, Students' Executive Body, Community of industrial Engineering Students, Community of International Students, Students Press, Rukun Rencang Community, Djemuran Theathre, Takmir of Bahrul Ullum, Students' Cooperative, and Saman Dance of



Industrial Engineering. Most of all students' activities could be accessed by this link <https://kemahasiswaan.uui.ac.id/informasi/organisasi-kemahasiswaan/>.

Below are study clubs that accommodated by FIT, as follows:

- Entrepreneur Club (Laboratory of Innovation and Organizational Design)
- Ergo Club (Laboratory of Work System Design and Ergonomics)
- Industrial Research Club
- Linux Study Club
- Delphi Study Club
- English Debating Society
- AutoCAD Study Club
- Telecommunication Club

Students' organizations, study clubs and other students' units works synergistically to design and present students-based activities. Those activities, such as scientific activities objected to improve insights and power of reasoning, which are seminar, panel discussion, training on science and technology, religion, politics and culture as well as entertainment-based activities, such as sports and art.



## Credit System for Higher Education

### Definition of Credit System

Currently, universities in Indonesia adopt credit system in running their academic activities. Students are allowed to determine their own subjects that limited and measured based on preceding semester performance. Specifically, for first semester students, subjects are offered in bundle that have determined by study program based on the existing curriculum. Study assessment is indicated by a certain measurement called GPA (Grade Point Average). While, each subject has its weight that interpreted as credit (Semester Credit Unit/*Satuan Kredit Semester* (SKS)). Following semester weight allocation is determined by the score of GPA on the preceding semester.

GPA of Previous Semester	Maximum Weigh of Credits
IP < 1,50	12 Credits
1,50 ≤ IP < 2,00	15 Credits
2,00 ≤ IP < 2,50	18 Credits
2,50 ≤ IP < 3,00	21 Credits
IP ≥ 3,00	24 Credits

One credit on a subject is related to learning activity that should be performed by students in a week, in which 1 credit equal to:

- 50 minutes of direct class session with lecture (mandatory).
- 50 minutes of assignment (if any).
- 50 minutes of subject-related independent study (if any).

Therefore, by taking 24 credits means that in one week he/she should:

- Participate in lecturing for 1.200 minutes.
- Accomplish the assignment with 1.200 minutes time allocation.
- Conduct independent study with 1.200 minutes time allocation.

## Courses and Exams

Courses are held based on the specific schedule. Students might select courses independently during the course registration period ("key-in" period) that generally carried out on the early semester.

Every student must participate at least 75% of total meetings of each subject. Later, evaluation is performed 3 times for each semester, as follows:

- Mid Exam
- Final Exam
- Remedial Exam

## Important Notes:

- a) *Each type of exam for a subject only conducted once as stated in the official schedule released by Faculty, NO make-up exam allowed in any forms.*
- b) *The condition for participating Final Exam is the minimum 75% attendance of total sessions, it also applies for supplementary exam/remedial exam*

## The calculation of GPA

Students' GPA is determined by the weight of subject and the grade of each subject. Later, the grade is stated in the letter format under certain weigh, as illustrated in table below.

No	Letter Grade	Grade Distribution			
1	A	$\geq 75$			
2	A -	72.5	$\leq$	N	$< 75$
3	A/B	70	$\leq$	N	$< 72.5$
4	B +	67.5	$\leq$	N	$< 70$
5	B	65	$\leq$	N	$< 67.5$
6	B -	62,5	$\leq$	N	$< 65$
7	B/C	60	$\leq$	N	$< 62.5$
8	C +	57.5	$\leq$	N	$< 60$
9	C	55	$\leq$	N	$< 57.5$
10	D (Fail)	$< 55$			

Note: *D is considered as FAIL*



The Calculation of GPA follows below formula:

$$GPA = \frac{\sum\{(Credits\ of\ Subject) \times (Weight\ of\ Grade)\}}{\sum(Credits\ of\ Subject(s))}$$

Note:

*Once a student has resumed entire subjects, the score that indicates the class performance will be called as Grade Point Average*

The classification for students' achievement based on GPA is notified by below remarks:

- GPA 2.76 - 3.00 is rewarded with Satisfying predicate
- GPA 3.01 – 3.50 is rewarded with Very Satisfying predicate
- GPA 3.51 – 4.00 is rewarded with Cumlaude predicate

#### Duration of Study

The curriculum is designed to be accomplished in 8 (eight) semesters with 144 credits in total. Therefore, a student is classified as pass once he/she has accomplished all subjects stated in current curriculum with  $GPA \geq 2,25$ .

#### a) Drop Out

Student is considered as DO, if:

- No credit is accomplished during the first 2 semesters. Hence, it is concluded that student has no intention to study at International Program, department of Industrial Engineering.
- In the first 4 semesters, credits accomplished < 30 credits with  $GPA < 2,25$ , therefore, student is concluded as incompetent.
- Performs the unregistered academic leave for 4 semesters consecutively (automatic DO and the action is considered as self-resignation).

#### b) Duration of Study

The maximum duration of study is determined as 14 semesters or effective 7 years including formal academic leave.

#### c) Academic Leave

Academic leave could be proposed after 1 (one) year or equal 2 (two) semesters of study. Terms and conditions are regulated by Universitas Islam Indonesia.



## Industrial Engineering Undergraduate Program

### Vision

To be internationally acknowledged as an undergraduate program, which is qualified, excellent and innovative in developing the knowledge of Industrial Engineering under the Islamic values.

### Mission

1. To organize the qualified and excellent education that oriented to stakeholders' requirements.
2. To conduct the creative, innovative and sustainable research, in terms of science and technology development.
3. To perform community service in its efforts to apply beneficial science and technology to society.
4. To perform *dakwah islamiyah* that oriented to *akhlakul karimah* by focusing it on great exemplary.

### Objective

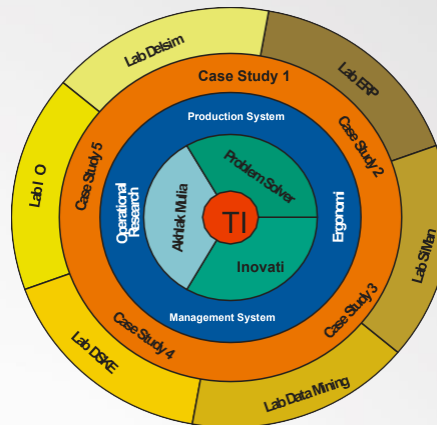
1. The graduates of Industrial Engineering could perform the planning, design, analysis, development, implementation and integrated industrial system improvement based on information system.
2. Curriculum improvement that is in line with industrial development
3. The development of conducive academic atmosphere
4. The enhancement of qualified researches that contribute to science and technology
5. The enhancement of graduates' soft skill in the basis of *risalah islamiyah*
6. The enhancement of community service activities that oriented to industrial development, dedicated for people's welfare
7. The enrichment of the quality of *dakwah Islamiyah* activities.

### Graduates' Profile

In this stage, Industrial Engineering sets the role that could be performed by graduates in certain skill or field from 1-3 years after graduation. The profile can be determined based on UII's graduates' profiling, the result of study as the indication of work market requirement (from government, business environment or industry) as well as the necessities in developing science and technology. Profiles that are set by UII, formulated as follows: graduates with Islamic characteristics and attitude, intellectual, leadership, insight towards nationality and community and problem solver quality. Based on above UII profiles and the result of study, therefore, the profiles of graduates in Industrial Engineering are determined, as follows:

1. Graduates with noble morality
2. *Problem solver* and
3. Innovator.

The graduates' profiles become the basic of determination for industrial engineering learning outcome. The correlation between graduates' profile and resources of Industrial Engineering is sourced from the subject group and laboratories as illustrated by following Figure:



Once a student has accomplished learning process generated from four course groups that supported by six laboratories facilities, it is expected that a graduate could play his role in the society by bringing 3 distinguish attributes that described as graduates' profiles, as the outcomes of education.

### Learning Outcomes (LO)

Learning outcomes are formulated by similar type of study program to meet acceptable understanding and could be referred nationally. Hence, it could be applied in certain roles and to be stated in graduates' profiles. Following are the learning outcomes for Undergraduate Program in Industrial Engineering, Faculty of Industrial Technology Universitas Islam Indonesia:

Aspect of Attitude	
1	Religious and believe to one God based on the value of <i>akidah Islamiyah</i> and able to practice the Islamic sharia in daily life as well as upholding the universal ethics of humanity
2	Demonstrating the inclusive view of life and able to exist in global community as well as preserving the Islamic and Indonesian identity
Aspect of General Skill	
3	Able to implement the leadership and exemplary principles in community and work environment
4	Able to formulate the role of contribution in promoting the society





5	Taking active role in a teamwork
6	Able to communicate effectively in Indonesian and English both in speech and in writing
7	Able to design a research project and analyse the result data of a research
8	Professional self-management based on professional ethical code as a fundamental of career development and long-life learning
Aspect of Special Skill	
9	Able to interpret the spirit of innovation to solve problems at the work field
10	Able to understand good governance in a supply chain system, hence the student could identify, formulate and suggest the productivity improvement on a system
11	Able to spread the idea to society, in terms of related field
12	Understand and able to implement interactions among engineering, business, technology and environment in the modern society
13	Able to implement and update the integrated system plan
14	Able to select resources and utilize the design tools and engineering analysis based on information technology and appropriate computation to perform engineering activities
Aspect of Knowledge	
15	To master basic principles of integration on Islamic value and related field of knowledge
16	To master the concept of mathematics, statistics, science, basic of engineering, basic of management and economics, as well as able to apply them
17	To master the contemporary knowledge in Industrial Engineering field as well as public policies

#### Quality Objectives

- To be internationally recognized
- Foreign students for degree program minimal 1%
- Foreign students for non-degree program minimal 1%
- Competence of disciplines for graduates > 3,3
- Average of lecturers' performance  $\geq 3,25$  (scale 0 s/d 4)
- Graduates with international achievement/academic activities > 5%
- Graduates with standard study duration > 90%
- Graduates who works at the first three months > 80%

#### A Glance about Undergraduate Program in Industrial Engineering

Department of Industrial Engineering was established in 1982. Since 2003, this department has earned A in accreditation, granted by National Accreditation Board for Higher Education. Continuous improvement in maintaining learning quality is kept on promoted to achieve international acknowledgement. The intention is finally manifested with the *ASEAN University Network Quality Assurance (AUNQA)*



*Standard* certificate of achievement that valid from 2019 – 2024. The curriculum is referred to provide students with the ability of productivity improvement in Supply Chain Management, that is built upon the recent revolution trend, industry 4.0

During lectures, students are accommodated with four concentrations, which are Operational Research, Production Engineering, Ergonomics and Industrial Management. Aside of undergraduate program, Department of Industrial Engineering also accommodates students with International Program (IP), which uses English as main language for entire academic activities. Other programs also formulated to enhance students' competence, such as student exchange with Chulalongkorn University and Universiti Teknikal Malaysia, International Internship, industrial internship with PT. Yamaha Musik Indonesia and PT. Inti Ganda Perdana, Foreign Lecturer Class, Expert Class, Industrial Research Club, Coaching Clinic and Expert-level Certification.

Recently, graduates of Industrial Engineering have reached over than 4500 alumni that have gathered under a community called as The Association of Industrial Engineering Alumni (IKATI). The existence of IKATI has opened the wider opportunities in career networking in various multinational companies, such as Pertamina, Angkasa Pura, Pupuk Kalimantan Timur, Perusahaan Gas Negara, GMF Aerospace, Institut Teknologi Bandung, Bank Syariah Mandiri, Inti Ganda Perdana, PT. Perusahaan Listrik Negara, PAMA Persada, POS Logistik, as well as career as the entrepreneur.

Several fields could be promoted for Industrial Engineering graduates, among others, Production Analyst, Product Engineer, Health Safety and Environment Engineer, Human Capital Manager, Cost Control Engineer, Quality Engineer, Marketing and Sales Engineer, Data and Information Analyst, SAP/ ERP Consultant, Project Manager, Academicians, Supply Chain Manager, Supply Chain Risk and Business Analyst.

### International Program (IP)

FIT UII has initiated the establishment of International Program in 1999. It accommodates students with lectures and entire academic activities, which apply English as a main language. Until recently, FIT only offers Industrial Engineering as a department with International Program.

International Program focuses on the implementation and development of Industrial technology with the support of proper information technology. In which, the rapid development of information technology has altered the business environment to the global stage. Organization management and more distributed production system need integrated planning and control to create working flow which are smooth, effective and efficient. The subjects and syllabus continuously being adjusted with the latest



trend of technology development to anticipate dynamic change of business environment.

International collaboration with overseas institutions becomes inseparable part of the improvement that must be constantly maintained to establish good education network, to assist the students to be long life learner with excellent insights. It is expected that students could continue their education in designated universities, which already collaborated with FIT UII, without considering to re-take the same accomplished subjects.

Dual degree program, student exchange, twin class, research, instructor exchange, international lecture series, postgraduate program collaboration and other forms of collaboration will be improved both in quantity and quality. In the meantime, several collaborations with reputable universities in Indonesia and overseas have been executed and initiated.

The graduates from International Program Industrial Engineering are employed in various fields as part of integral system that consists of human, tools, machine, material, capital, management and organization, with the ability of excellent communication in English, which currently has become basic requirement in business environment.

### Laboratory

#### 1. Laboratory of Integrated Manufacturing System

This laboratory provides students with skill and specialization in production planning and control as well as production floor management. The activities include designing product, producing, product assembling, calculating the inventory and numbers of workers, scheduling, performing product control and others, with the support of computerization.

#### 2. Laboratory of Work System Design and Ergonomics

This laboratory provides students with skill and specialization on the concept implementation of work system design application in order to achieve certain productivity level, ergonomics and related aspects, particularly physiological and environment aspects.

#### 3. Laboratory of Industrial Statistics and Optimization

This laboratory provides students with skill and specialization in utilizing various types of statistics models and methods to solve problems in industry. It also accommodates students with specialization in problem solving using several types of optimization and mathematical model.

#### 4. Laboratory of Modelling and Industrial Simulation



This laboratory provides students with skill and specialization in simulating industrial system, service and business management. Entire laboratory works are performed with the support of computers. Two mechanism of laboratory works are system analysis and industrial games.

#### 5. Laboratory of Enterprise Resource Planning (ERP)

This laboratory provides students with skill and specialization in Enterprise Resource Planning, in which the system is applied by most of companies all over the world. This laboratory accommodates students with international certification that is acknowledged worldwide.

#### 6. Laboratory of Innovation and Organizational Development

This laboratory provides students with skill and specialization on industrial system innovation and management, such as organizational development, facility layout in industry and its effect towards worker's performance and production cost.

### Curriculum

#### Semester 1

No	Code of Subject	Course	Credits	Pre-Requisites
1	52215001	Religion Education	2	
2	52215002	Pancasila and Civil Education	3	
3	52213003	Calculus 1	3	
4	52213004	Physics 1	2	
5	52213005	Introduction to Industrial Engineering	3	
6	52215006	Academic Writing and Communication	3	
7	52213007	Basic of Industrial Engineering Design	3	
8	52213008	Matrix and Vector	2	
			21	

#### Semester 2

No	Code of Subject	Course	Credits	Pre-Requisites
1	52225001	<i>Ibadah and Akhlaq</i>	2	Religion Education
2	52223002	Programming Logics	3	
3	52223003	Calculus 2	3	Calculus 1
4	52223004	Physics 2	2	Physics 1
5	52223005	Physics Laboratory	1	Physics 1

6	52223006	Industrial Statistics 1	2	
7	52223007	Engineering Mechanics	2	Physics 1
8	52223008	Materials Science	2	
9	52223009	Chemistry	2	
10	52223010	Introduction to Economics	2	
			21	

### Semester 3

No	Code of Subject	Course	Credits	Pre-Requisites
1	52235001	Islamic Leadership	2	Ibadah and Akhlaq
2	52232002	Physiology and Work Measurement	4	Engineering Mechanics
3	52233003	Manufacturing Process	3	Engineering Material
4	52233004	Optimization	3	Matrix and Vector
5	52233005	Industrial Statistics 2	3	Industrial Statistics 1
6	52233006	Cost Estimation and Analysis	2	Introduction to Economics
7	52235007	Industrial Psychology	2	
8	52233008	Environmental Science	2	Chemistry
			21	

### Semester 4

No	Code of Subject	Course	Credits	Pre-Requisites
1	52242001	Production Planning and Control	3	Calculus 2, Introduction to Industrial Engineering
2	52243002	Stochastic Model	3	Optimization
3	52243003	Engineering Economics	2	Cost Estimation and Analysis
4	52242004	Ergonomics and Work System Engineering	3	Physiology and Work Measurement
5	52243005	Database Management System	3	
6	52243006	Quality Control and Assurance	3	Industrial Statistics 2
7	52242007	Design of Industrial Organization	2	Physiology and Work Measurement, Industrial Psychology
			19	

#### Semester 5

No	Code of Subject	Course	Credits	Pre-Requisites
1	52255001	Islamic Civilization and Thought	2	
2	52252002	Facilities Layout and Planning	3	Production Planning and Control 1, Cost Analysis and Estimation
3	52252003	Production Planning and Control 2	2	Production Planning and Control 1
4	52252004	System Modelling	2	Matrix and Vector, Optimization
5	52252005	Decision Analysis and Data Mining	3	Industrial Statistics 2
6	52252006	Management Information System	2	Database Management System, Design of Industrial Organization
7	52252007	Project Management	2	Engineering Economics
8	52252008	Product Design	3	Ergonomics and Work System Engineering, Basic of Industrial Engineering Design
			19	

#### Semester 6

No	Code of Subject	Course	Credits	Pre-Requisites
1	52262001	Intelligent System	2	Matrix and Vector, Optimization
2	52262002	Enterprise Resource Planning	3	Production Planning and Control 1, Management Information System
3	52262003	Enterprise Design and Analysis	3	Engineering Economics
4	52262004	Design of Integrated Industrial System	3	Production Planning and Control 2
5	52262005	Computer Simulation	3	System Modeling
6		Elective Course 1	3	
7	52262006	Internship	3	100 credits
			20	





#### Semester 7

No	Code of Subject	Course	Credits	Pre-Requisites
1	52272001	Islamic Entrepreneurship	2	
2	52273002	Basic of Research Methodology	2	System Modelling, Stochastic Model
3	52272003	Productivity Engineering	3	Ergonomics and Work System Engineering, Quality Control and Assurance
4	52272004	Supply Chain Management	3	System Modelling, Production Planning and Control 1
5		Elective Course 2	3	
6		Elective Course 3	3	
7	52271005	Community Service	2	100 credits
			18	

#### Semester 8

No	Code of Subject	Course	Credits	Pre-Requisites
1	52282001	Undergraduate Thesis	5	Basic of Research Methodology, 123 credits, 1 supported elective course, have taken/in the process of conducting internship
			5	

Total Credits

144

## Elective Courses

### Field of Interest: Industrial Management

No	Code of Subject	Course	Credits	Pre-Requisites
1	52262001	Human Capital Management	3	Industrial Psychology
2	52262002	Strategic Management	3	Design of Industrial Organization
3	52262003	Knowledge Management	3	Management Information System
4	52262004	Technology Management	3	Production Planning and Control 1
5	52262005	Risk Management	3	Engineering Economics
6	52262006	Financial Management	3	Engineering Economics
7	52262007	Asset Management	3	Production Planning and Control 1
8	52262008	Service Management	3	Quality Assurance and Control
9	52262009	Decision Support System	3	Management Information System
10	52262010	Industrial Marketing	3	Cost Estimation and Analysis

### Field of Interest: Operation Research

No	Code of Subject	Course	Credits	Pre-Requisites
1	52272011	Six Sigma	3	Quality Assurance and Control
2	52272012	Multivariate Analysis	3	Industrial Statistics 2
3	52272013	System Dynamics	3	Computer Simulation
4	52272014	Agent Based Modelling & Simulation	3	System Modelling
5	52272015	Quality Engineering	3	Quality Assurance and Control
6	52272016	Business Intelligent	3	Decision Analysis and Data Mining
7	52272017	Special Topics	3	

### Field of Interest: Production System

No	Code of Subject	Course	Credits	Pre-Requisites
1	52272001	Advanced Automation	3	Programming Logics, Industrial Electronics (modified by IP)
2	52272002	Lean Manufacturing	3	Production Planning and Control 2
3	52272003	<i>Halal</i> Supply Chain Management	3	Production Planning and Control 1



4	52272004	Intelligent Manufacturing System	3	Production Planning and Control 2
5	52272005	Sustainable Manufacturing	3	Production Planning and Control 2
6	52272006	Maintenance Management	3	Production Planning and Control 1
7	52272007	Cellular Manufacturing System	3	Facilities Layout and Planning
8	52272008	Business Process Integration	3	Enterprise Resource Planning
9	52272009	Humanitarian Logistics	3	Supply Chain Management
10	52272010	CAD/ CAM/ CAE	3	Product Design
11	52272011	Product Design & Development	3	Product Design
12	52272012	Logistics Management	3	Production Planning and Control 2

Field of Interest: Ergonomics

No	Code of Subject	Course	Credits	Pre-Requisites
1	52262014	Occupational safety and health	3	Ergonomics and Work System Engineering
2	52262015	Human Computer Interaction	3	Ergonomics and Work System Engineering
3	52262016	Man-Machine System	3	Ergonomics and Work System Engineering
4	52262017	Industrial Ergonomics	3	Ergonomics and Work System Engineering
5	52262018	Environmental Ergonomics	3	Environmental Science, Ergonomics and Work System Engineering
6	52262019	Ergonomics Design for Special Purpose	3	
7	52262020	Cognitive Ergonomics	3	
8	52262021	Macro Ergonomics	3	





## Syllabus of Undergraduate Program in Industrial Engineering

### Semester 1

#### 1. Religion Education

This subject constitutes as a compulsory subject given to all students in Universitas Islam Indonesia. The main objective of this subject is to give Islamic belief understanding as a solid foundation as Moslem to the students. Thus, the students will be able to apply *tauhid* values in every aspect of their lives.

The objectives of this subject are based on the UII mission, to create professional, competent, skillful scholar who could uphold the Islamic value.

#### 2. Pancasila and Civil Education

It is a compulsory nationalism subject. It gives students comprehension about basics law in Republic of Indonesia especially Pancasila and Constitution 1945. This subject explains about historical formulation of Pancasila, implementation of Pancasila values in daily life and dynamics interaction of Pancasila as an open ideology. The materials of this subject consist of history, formulation, structure of Pancasila and Constitution 1945, definition of Pancasila as basic philosophy in Indonesia, Pancasila as point of view, identity, and as unifier of the nation. Civic education is a obligatory subject for the students. It provides understanding about the basis of Indonesia especially Pancasila and 1945 Constitution for the students. This subject explains about the history of Pancasila, its implementation in the daily life and the concept of Pancasila as an ideology. This subject covers the history, formula, and structure of Pancasila and 1945 Constitution. Besides, this subject will also explain about the definition of Pancasila as the Indonesian basic philosophy, way of life, and basic character. This subject will help the students to understand verses in Pancasila along with their implementation in daily life. This subject will emphasize discussion on the study cases and students' opinion

#### 3. Calculus I

This subject provides students with a complete comprehension about basic concept of Calculus. It consists of real number system, equality, inequality, absolute value, limit, continuity, asymptote, and differential, method of differential and application of calculus especially differential in industrial problem. Therefore, the learning strategy is more emphasized in lecture method as a conventional method of learning and individual learning with several case studies to be solved in class.

#### 4. Physics I

This subject will be closely related with Physics II that will be taught in the even semester. The materials cover introduction to physics and measurement, vector, kinematics, dynamics, work and energy, linear momentum, object rotation, angular



momentum, static balance and elasticity, fluid mechanics, thermodynamics law I, kinetics theory of gasses and thermodynamics law II.

To support the description of this subject, some references are recommended. Uncertainty theory, physics, mechanics – magnetic – electricity and thermo physics that contains basic concepts are applied in the learning process to support advance Physics concept. For example, to understand the concept of gyroscope movement, the concepts in kinematics and dynamics theory are also required. Concept in thermodynamics also needed to be mastered in order to understand the concept of statistical Physics. Basic Theory in Physics I could drive student to understand advance physics.

#### 5. Introduction to Industrial Engineering

This subject is considered as the core subject of Industrial Engineering. It is designated for freshman to deliver better and complete understanding on basic of Industrial Engineering. By learning this subject, students are expected to comprehend the basic of Industrial Engineering that covers Operational Science, Production Engineering, Management Research and Ergonomics/Human Factors Engineering. From the understanding, furthermore, students are expected able to think under perspective of Industrial Engineering, systemic and innovative that could provide alternative solution on problems in system, individually or in group. This subject also describes illustration on possible profession for future graduates.

#### 6. Academic Writing and Communication

Writing and Scientific Communication is an obligatory subject given in the beginning of study period. It is composed in two credits and held on the first semester. This subject is designed to help the students in order to be able to arrange and write the result of research rightly in reports and paper. Writing skills are very important for the students since university life required them to write extensively. Moreover, this subject is also designed to introduce all students with scientific communication, where the reports or papers must be presented to audience. Academic writing and Communication subject is based on the standard of content and competence that involves introduction of research, types of research, arrangement of reports, reviewing and composing papers. Therefore, in the lecturing process, it uses active learning strategy and group discussion as means to support the students to reach the standard competence

#### 7. Basic of industrial Engineering Design

Basic of Industrial Engineering Design contains basic knowledge that must be mastered by Industrial Engineering bachelor especially in designing process. The output of this subject is capability of engineering drawing and other industrial engineering diagram that functioned to describe some information as basic concept in designing. Basic materials of Industrial Engineering design are based on content and competence of its graduates covers introduction to Industrial Engineering,



designing using CAD, geometric construction, basics of engineering drawing, dimensioning, assembling and product documentation.

#### 8. Matrix and Vector

This subject provides basic understanding on matrix and vector and its application in modelling and solving real case. It covers: Matrix, determinant, system of linear equation (SPL), operations on vector, euclides vector, subspace of matrix, basis and dimension, eigen value, linear transformation ( $R^n$  to  $R^m$ ), and all of its application to support other subjects in Industrial Engineering fields.

### Semester 2

#### 1. *Ibadah* and *Akhlak*

This subject is a compulsory subject for all students in Universitas Islam Indonesia. The objectives of this subject are based on the UII mission, to create professional, competent, skilled personnel and scholar who upholds the Islamic value, knowledgeable in action and actionable in knowledge. Thus, this subject embodied religion education so that the students will understand and able to implement basic competence of *ibadah* and *akhlak* based on the Islamic teaching.

#### 2. Programming Logics

This subject provides understanding on logics and programming. The students will be directed not only to understand the concepts of logics and programming but also able to implement them in solving various problems. Learning strategy is emphasized to logical thinking in resolving problems and tutorial-based practices in laboratory, individually and in group. The materials will cover logics, programming, techniques of problem solving, introduction to programming language, types of data, variables, objects and expression, input and output statement, function and procedure, branching, looping, searching, and sequencing. On the early sessions, students will be exposed with brief description about position of the subject in Industrial Engineering, learning method and introduction of subject. The combination between theories and practices are expected to help students with better understanding on logics and programming.

#### 3. Calculus 2

This subject gives comprehension for students about basic integral. The advanced integral will be further discussed in Calculus Multivariate. Students are expected to be able to identify, analyse, and solve problems of Calculus 2. The materials of Calculus 2 are consist of concept, technique, and integral's application including determinate integral and indeterminate integral. Moreover, this subject teaches students to use application/software in order to solve integral's problems.





Therefore, learning strategy is more emphasized on lecture method and individual learning with many problems exercise.

4. Physics 2

This subject is the continuation of Physics 1. It covers materials as follows: Electrostatics: The force of charges' interaction (Coulomb's Law), electrical field strength, electrostatic potential, capacitance, Basic electrical quantities, definition of electrical current, Electromotive Force/Electromotance, direct current, Kirchoff's Law, resistance, electrical power and force. Magnetism: intensity of magnetic field, magnetic field on moving charge, permeability, magnetic works, inductance, generating the alternating current. Alternating current circuit: RLC circuit/resonant circuit, average value and value of RMS, active and reactive energy, factors of energy Electrical measurements: avometer, wattmeter and oscilloscope. Ray: Source of Ray, the characteristics of ray, reflection, diffraction and illumination, optics, geometrical optics and physical optics, optical devices.

5. Physics Laboratory

This laboratory works is compulsory for Industrial Engineering's students. It will expose students with basic knowledge of electricity, magnet, mechanics and several materials concerning to nature physics. This laboratory works also support subjects that directly or indirectly related to physics. From the experiments, students could learn to understand the physical process of occurrences. It also helps students to comprehend the laws in Physics regarding to electricity, signal and conductivity.

6. Industrial Statistics I

Generally, this subject provides students with basic knowledge on descriptive statistics and probability theory. It could be applied in research methodology to determine research sample, the research itself is defined as sequence of activity that covers data collecting, presenting, analysing, interpreting and concluding. Descriptive statistics is applied in presentation, paper writing, the composing of internship and final project reports. Interesting presentation could support the quality paper or oral presentation. Besides, the graduates are expected to be a decision maker that could grab information in group of data promptly. This subject covers basic statistics, descriptive statistics, data and processing (a measure of central tendency, measure of position and measure of statistical dispersion) both for single or grouped data, graphs, sampling theory, probability theory, variance, repeated measures of variance, conditional probability and Bayes rules, random variable, distribution of random variable probability and theoretical probability distribution (discrete and continue).

7. Engineering Mechanics

The objective of industrial engineering is to create graduates that can provide optimum solution of the problems on integral way both correctly and

systematically. Engineering mechanics covers the concept about force and its effect towards several constructions in addition to the methods. This can design work system and ergonomic products in order to improve the performance and meet the quality required by customers. Students are expected to be able to provide the best solution over the problems in integral system with insufficient or expensive resources. Besides, they are also expected to provide the alternative solution supported by analysis tools as operation research, financial analysis, feasibility study, engineering economics, ergonomics, etc.

#### 8. Materials Science

Industrial Engineering is an applied science related with designing, planning, application, and integral system improvement consisted of human, machine (tools), material, capital management and organization, that influenced by economic environment, social, technology and politics. Integral System could emerge as Manufacture Company, Service Company or other institutions involving above-mentioned components. Problems will appear related with work performance and customer satisfaction. The objectives of industrial engineering are to create graduates that could provide optimum solution towards problems that involve in integral system.

#### 9. Chemistry

This 2 credits course is addressed for freshman on the second semester. The students are intended to understand reaction concept with all related formulas, process conversion on existing production process, and especially to understand in noticing and measuring the role of inputs (material, labour, energy, and machines) with its correlation of output productivity (product) in a production system.

#### 10. Introduction to Economics

This subject will discuss about the definition and history of economic thoughts, business cycle and monetary history in addition to system of money distribution and the concept of central bank. It also includes interests and usury/*riba*, GDP, GNP, costumer behaviour, monopoly, oligopoly, monopolistic market and perfect competition. All discussions are oriented to benchmarking system of conventional and alternative economics, especially Islamic economics.



## Semester 3

### 1. Islamic Leadership

This subject gives basic competence for all students to understand Islamic leadership study. This subject also includes the discussion on the leadership both in Islamic and Western concept in addition to learning about the principals of leadership in Al Qur'an. Those three topics are intended to enable the students to formulate the concept of future leadership for the needs of organization and human being.

### 2. Physiology and Work Measurement

Physiology and work measurement is a part of subjects in industrial engineering related with ergonomics as one of the basics of industrial engineering. Learning from work physiology, students are expected to understand human physical limitation from the perspective of human physiology in working condition, so the working performance could be improved as well as productivity. From this subject, the students will learn on work measurement method based on standard time. The materials of this subject are introduction to anatomy and work physiology, musculoskeletal system, respiration and circulation, factors that influence work physiology, work nutrition, physical work measurement method, work shift, stress management, productivity, direct and indirect work measurement, work sampling, and Method of time measurement.

### 3. Manufacturing Process

Industrial Engineering Program Study is an educational institution that obligates to support students with the expertise of designing, improving, and complex system installing. One of the required skills is the knowledge of product design using machine tools. This Manufacturing Process subject becomes important since it is a basic of producing a product/component. This product dimension turns to be something quite important due to its function and benefit of utility, as it will deal with the issue of standard of content and competence of passing grade covering material characteristics, types, and function.

### 4. Optimisation

This subject is intended to expose the method of formulating industrial problems into mathematical model to get the optimum solution. The optimization is based on standard of content and standard of graduates' competency consists of concept of basic modelling, Linier Programming Model Formulation, Problem Solution: Graph Method, Simplex Method, Duality and Sensitivity Analysis, Assignment and Transportation Problem.





## 5. Industrial Statistics 2

This subject provides understanding to students about industrial statistics concept, particularly Statistical Inference. Statistical inference is divided into two major parts, which are estimation and hypothesis test. Students are accommodated by basic concepts of statistical inference and how the application of various techniques in statistical inference could solve problems occurred in industry. The material covers the definition of industrial statistics, definition and techniques in statistical inference, definition and technique of estimation and hypothesis test, dot estimation, interval estimation, hypothesis test for single and double parameter, ANOVA one way and two ways, regression and correlation.

## 6. Cost Analysis and Estimation

This subject supports one of the Industrial Engineering's Body of Knowledge, which is: Management System. Students are expected to understand basic knowledge related on company's financial, capable to calculate production cost and analyse the company's financial performance. The materials cover type of cost, its characteristics, the implementation based on industry, cost system based on order, processes and activities, process of financial accounting, financial performance analysis based on accounting report.

## 7. Industrial Psychology

Department of Industrial Engineering accommodates their students with a competency of an engineer by designing, implementing and improving its industrial system in an integrated way. For that matter, an industrial engineering graduates shall be knowledgeable and capable in understanding an industry/organization from different aspects, start from technical, managerial, and human aspects both physically and mentally. To align with the purpose, the subject of human psychology in the scope of industrial organization and its environment is presented. Materials of industrial psychology are based on its core subject and graduates' competence standardization that comprise: comprehension of industrial psychology history, scope, and role of psychology in industrial and organizational activity. Analysis of position, recruitment, selection and work placement, training and human resource development, work assessment, motivation, work stress and satisfaction rate, work health and safety, work environment and ergonomics, work group and leadership, organizational culture and development and consumer behaviours.

## 8. Environmental Science

This subject is designated for sophomore students with 2 credit points. Students are expected to be more familiar with ecosystem concept, waste treatment system, understand the characteristics of pollutant, and could apply AMDAL integrated with



all disciplines related to minimize its destructive effect and environment pollution caused by industrial waste.

#### Semester 4

##### 1. Production Planning and Control 1

Production Planning and control are activities in manufacturing process that determine what kind of products that later will be manufactured, the quantity of products, timeline and person in charge who is responsible for each process. In order to meet the accurate answer for those items, a market study will be conducted by having a market demand forecasting. The result will be implemented to design production and sales planning or later called as aggregate planning. It is then followed by deeper planning which is the determination of production main schedule. Material planning and machine scheduling on production floor will support production schedule. To run more effective and efficient production planning, it takes good planning techniques or methods both heuristic and optimization. This subject will support students with more effective techniques or methods in production planning and control, which is appropriate to be implemented in manufacture. This subject will discuss several techniques or methods in Production planning and control that will be started with forecasting, aggregate planning, master production planning, material planning, and production scheduling

##### 2. Stochastic Model

Problems on several sectors whether economics, business, or other sectors, undeniable are getting more complicated and require accurate decision-making. The factors are involved varied environments, whether definite and indefinite environments, risk environment and competitive environments. Understanding about environmental conditions will underlie a person to be smart and wise in identifying environment condition for decision making in order to reach appropriate effectiveness. Two types of analysis are identified in decision-making process, which are quantitative and qualitative based on consideration and management experiences, expert's intuition on the problems and quantitative analysis that focused on facts or quantitative data related to problems. Quantitative analysis is usually applied for decision-making approaches. Defining problems properly will require model development, which can be used to represent above problems. Mathematical model turns to be the important part of quantitative approach. This mathematical model consists of deterministic model and probabilistic/stochastic model.

##### 3. Engineering Economics

Problems occur in many sectors especially in economy and businesses have risen in complexity that requires an integrated view in dealing with them. We are faced



inevitably by two important and related aspects, physical and economy environment. A comprehension of physical environment will equip a student to observe, identify, and control technical concept to achieve a certain purpose effectively. A comprehension of economy concepts on the other hand will assist in the side of efficiency. The subject of engineering economics delivers fundamental concept to students related with two environments mentioned in order to enable them in analysing economic aspects of a technical investment planning.

#### 4. Ergonomics and Work System Engineering

This subject is one of the 3 credits mandatory subjects designated for sophomore students. Ergonomics and work system design is considered important in industry. It is purposed to provide basic knowledge on designing and improving work system by using ergonomics approach. Most of the manufacturing and service companies have allocated significant cost and time to implement this. It is recommended for students to master this subject for their future job. It covers Ergonomics, Anthropometry, design of workstation, design of supporting tools, manual material handling, cognitive, display and control, macro ergonomics, usability, principles on working tools, work system/workplace and work environment.

#### 5. Database Management System

This subject provides understanding about the concept of database management. Students are directed to understand more about the intended concept that includes implementing database management in the information system. Learning strategy will involve lecturing, discussion, software demo and practices. The early materials cover data concept, information, basic knowledge and database management. It is related with software that applied for database management; therefore students will have clear description on the application or advantages of this subject. Mid sessions of lectures are emphasized on materials that related to database design and development. By the end of lectures, discussion on big project will be involved to make sure that the students are well aware with the concept, implementation, designing of proper database under existing study case.

#### 6. Quality Control and Assurance

An enterprise competitiveness can be assessed by its product / service valued by customers which is compared with other competitors. The value of product or service can be defined in terms of quality, price, and delivery time. Quality control has a significant role to create customers' value. The roles of quality control cover the whole process of business activities starts from materials delivered by supplier, production process and along the way to the end-process. The quality of every output from each process is monitored to ensure the finished good will satisfy end customers.



## 7. Design of Industrial Organization

Based on the development and application of industrial system, the graduates are demanded to have competences in designing and developing industrial organization. Design of Industrial Organization is a 2 credits compulsory subject in Industrial Engineering curriculum that oriented to the competence of students in designing, analysis, industrial organization innovation and management. The learning strategy refers to understanding aspect (cognitive), attitude (affective) and behaviour (psychomotor). In its achievement, several processes are applied, that cover materials about design concept and organizational development, discussion on seminar with experts and alumnae about actual industrial organization, assignment and assistances, SME's visit for real industrial organization, assignment presentation to nurture communication ability. The materials involve concept of organization, design, the change of organization and its environment, organizational structure, establishment and management, organization culture, design of organization, strategy and technology.

## Semester 5

### 1. Islamic Civilization and Thought

This subject of thought and Islamic Civilization constitutes university subject (local curriculum) given in even semester for all study programs in Universitas Islam Indonesia for 2 credits.

Based on the vision and mission of both UII and department, this subject is expected to be able to embody the integrated religion subjects in Universitas Islam Indonesia. On the other hands, this subject also gives basic competence for student to understand thought and Islamic civilization fundamentally. This subject deals with the growth of thought and Islamic civilization of pre-Islam period to the growth of Islamic civilization in Indonesia. It also deals with the history of Islamic High School (STI) as a part of UII's history. Therefore, this subject explains the Islamic thought aspects in broad scope such as; theology, state administration, law, philosophy, tasawuf, etc that occurred and grew during classic to the contemporary era.

### 2. Facilities Layout and Planning

This subject provides understanding on concept of facility layout and planning and location determination. Students will study and comprehend the basic concept to be able to design a facility based on main and secondary data. Project based learning is determined as the learning strategy. A group of 3 or 4 is required for that purpose. The materials cover introduction to Facility layout and planning, traditional approach in designing the facility, basic model on location's problem, advance model on location's problem, location determination, optimization of location determination, basic model on layout determination, carry out the layout planning, and optimization on layout planning. For the learning process, students are driven



to read related literatures and journals. References are the main source for composing the planning and group's assignment report (project).

### 3. Production Planning and Control 2

It considered as part of shop floor system that consists of several execution and control stages on production activity. Most of the companies have allocated significant cost and time to plan and improve the production activities performance. On this stage, every industry will plan, coordinate and direct the production activities to a system that will yield the product with minimal cost and short time span. The materials cover flow shop and job shop Assembly line balancing, Input/output control, Theory of constraints, Process planning: CAPP, Just in time production system, Group technology and cellular manufacturing and Flexible manufacturing system.

### 4. System Modelling

This course provides an understanding of modelling system concept for the students and guides them to be able to turn the real system into a mathematic model by giving prior comprehension on the concept of system and model. Therefore, the learning system is firstly more emphasized with lecture method and group assignment for three to four students. The topics in the first part of the course include the definition and kinds of systems, definition and characteristics of models, kinds of models (deterministic and stochastic), the stages of model development, mathematic modelling, parameter estimation, and model verification and validation. In the second part of the course, the students will need to conduct a practice on modelling a real system through a major project for 3 to 4 persons.

### 5. Decision Analysis and Data Mining

This subject provides understanding about the concept of decision analysis and data mining. Students are directed not only to understand the basic concepts of decision analysis and data mining, but only able to apply several of general techniques to solve problems in industry. The materials cover definition of decision analysis and data mining, techniques of decision making based on multi criteria (MCDM), analysis on data mining that employs several techniques, such as clustering, association rule and classification.

### 6. Management Information System

Information system is proven to give advantage and value to business/industrial organization and other sectors. Appropriate IT-based MIS implementation will support organization management at all levels. It could elevate the effectivity and broaden the scope of decision making in terms of competition strategy. IT-based Management Information System has become important parts or even held the strategic value to modern organization. Therefore, subject's understanding is basic needs for professionals in business and industry. The topics that involved in this



subject cover information technology (computer system, hardware component, software component, computer network and internet), database, DBMS, MIS concept and application in organization, decision support system and executive, artificial intelligence, MIS development, social issues, ethics and information system security.

#### 7. Project Management

Industrial Engineering Department as part of education institution has the duty to equip the students with the skills about designing, improving, and installing complex system. One of the essential skills is knowledge and skill of project management. Project management becomes very crucial since the unique and distinctive characteristics of every project with the operational management. Such characteristics will influence the planning, scheduling, budgeting, and the controlling process. Based on the content and graduate competence standard, this subject covers the concept of project management, planning and scheduling, implementation, and project controlling.

#### 8. Product Design

Department of Industrial Engineering has the task to equip the students with the skills on designation, improvement, and instalment of complex system. Therefore, the knowledge on design and product commercialization becomes a very crucial course to realize such skills. The material of Product Design is based on the standard of content and graduates that includes product design concept, product design organization, product designation process, market analysis, product specification determination, concept development and selection, and prototyping. Besides, this subject also explains the methods of product designation such as quality function deployment and design for manufacturing. In the end of the course, the students will also learn to plan product commercialization.

### Semester 6

#### 1. Intelligent System

Information Technology based in manufacturing system is expected to be the local genius of Department of Industrial Engineering, Universitas Islam Indonesia. The context of information technology in the competence of the study program can be seen from the curriculum that consists of various information technology based courses such as Data Base Management, Management Information System, Analysis and Design of Information System, Decision Support System, Intelligent System, Computer Simulation, etc. Besides the courses, the content of information technology can also be seen from some practical courses which mostly are based on information technology. The intelligent System is one of the compulsory subjects in this department. In this course, students will study the basics of Artificial Intelligence





(AI), the making process of AI and the parties involving, acquisition and representation of knowledge and methodologies used in the making of knowledge basis such as fuzzy, uncertainty, ANN, and GA methods. Intelligent System is offered in the sixth semester from the total 8 semesters. This subject requires basic knowledge on optimality and some comprehension on system especially business and industry in several subjects such as Management Business, Production System, and Facility Layout and Planning.

## 2. Enterprise Resource Planning

Department of Industrial Engineering enhances their students with ability to integrate business activities of an enterprise from information system point of view. The so-called ERP software, SAP is adopted as a learning media. The software will assist student to understand all aspects in business in an integrated view; logistics, financial, production planning, human resources and so on are tied and related to each other. Based on core-subject and student's competence, the materials of Enterprise Resource Planning (ERP) comprise of: background and objectives of ERP, ERP's issuer company and its software development, basic concept and software implementation. As for the module itself, students will study the flow of information system of every department in a business which consists of Sales & Distribution, Materials Management, Production Planning, Financial Accounting, Controlling and Human Capital Management. The active learning strategy is used as a learning process in this subject as an effort to understand the core subjects of ERP and how it is implemented in enterprise.

## 3. Enterprise Analysis and Design

This subject is the application of some previous courses such as Introduction to Economics, Production Planning & Control, Cost Analysis and Estimation, and Design of Industrial Organization. This course is designated for students in the sixth semester, in consideration that the students have mastered the knowledge and skills in previous subjects mentioned before. This subject will help the students to illustrate the way to implement the knowledge and skills from the previous subjects. It is expected that the students are ready to run a company owned by them or other persons. This is in accordance with the vision and mission of the faculty and university that the graduates of Industrial Engineering are not only able to run other people's company but also to establish their own company and provide new work opportunities.

## 4. Design of Integrated Industrial System

This subject is decided as compulsory 3 credits subject. The students are required to practice the theories from previous semester independently. In this subject, no lectures needed. Students will be grouped and assigned with certain projects, from designing the product to selling it. Week after week, there are stages that should be accomplished related to the assignment. It covers field task, presentation, the design



of product prototype, and product's selling. On the early sessions, the students will be coached with the general concept of subject and assignment. Each group will be assigned with products in line with determined topic. Each group should determine the market demand and product determination. Later, it will be followed by product designing, prototyping, process design, calculating HPP and defining the marketing strategy. Later, each group should try to sell the products, perform the expo and compose the financial report.

#### 5. Computer Simulation

Simulation is one of the methods learned in Department of Industrial Engineering to solve problems in industry. Simulation is applied when the problem complexity has become irresistible that causes either numeric or analytic solution are not visible for the problem. By learning this subject, the students are expected to be able to design, install and improve the integrated system's performance by establishing credible model as parts of problem solving. Generally, this subject will discuss about discrete system simulation that consists of system thinking concept, system basic concept, model and methodology, input modelling, assessing the model credibility (verification, validation and replication), and techniques of best alternative selection (design of experiment).

### Semester 7

#### 1. Islamic Entrepreneurship

This subject is purposed to provide business overview from the perspective of conventional and Islamic rules. The behaviour of conventional business refers on capitalism that oriented to profit than "*berkah*" in Islam. The interaction of these contradictive perspectives will be discussed. This subject will illustrate business behaviour among business actors. The approaches will cover both theoretical and empirical. Theoretical approach will be emphasized on economics theory understanding that is implemented in business while empirical approach will be emphasized on observation and analysis on business practices that performed in economic environment as well as the establishing of entrepreneurs' characteristics and mental.

#### 2. Basic of Research Methodology

This subject will discuss the concept of scientific research in the scope of industrial engineering. The students will learn to comprehend kinds of research in industrial engineering department. The participants will also learn to understand the difference of general research and specific research and the minimum standard of research in Industrial Engineering. The topics covered in this course are definition and kinds of research, researches in the scope of industrial engineering, selecting research topics, setting up the state of art, proposal writing techniques, and



presentation techniques. Therefore, in the learning process of this subject, the strategy used is active learning and group discussion.

### 3. Productivity Engineering

This subject provides understanding on measurement concept and productivity management. Principles of productivity engineering are correlated with efficiency, effectivity, quality and performance as well as collaboration among those factors that required by management to meet better improvement in organization.

### 4. Supply Chain Management

Recently, competition is no longer happens among companies but on companies' networking. Therefore, cooperation between company and its supplier and distributor is inevitably necessary to convey the products or services to customers. Supply Chain Management (SCM) learns to manage entire activities for distributing the material, information and financial, starts from raw material of supplier's supplier to manufacturer's supplier, to distributor, to retail and eventually to customers. The function of SCM is wider than logistics or company's procurement. This subject delivers understanding to students about the definition of SCM and logistics, planning of SCM strategy, strategy of distribution and transportation, inventory management, procurement, warehousing, the function of information technology in SCM and performance measurement in SCM

## Semester 8

### 1. Undergraduate Thesis

#### Elective Courses

#### ❖ Field of Interest: Industrial Management

##### Human Capital Management

Basic framework of human resource management and its challenges. The approach of human resources management: started from human administration to human capital approach, the assessment of human capital contribution towards objectives accomplishment and organizational change, strategies and asset planning of human resources, recruitment process, selection and adaptation. Design, analysis and position evaluation. Human resource performance management, career management, motivation, work satisfaction and payment system, CSR and employees' welfare.

##### Strategic Management

Introduction to strategic management, strategy approach, implementation of business plan, group strategy, analysis on competitor, business strategy/company's strategy, vertical strategy decision, Capacity decision, New business strategic



### Knowledge Management

Concept of knowledge management, the relationship of company's strategies and knowledge strategy, the development of culture and organization by using culture approach for knowledge transfer, the design of road map on knowledge management implementation, the utilization of information technology in knowledge management, its design in organization, implementation of assessment techniques in knowledge management.

### Technology Management

Basic concept of technology, basic concept of technology management, integration of technology strategy, identification of its requirements, technology audit model, technology life cycle, technology transfer, strategy of technology development, technology patent.

### Risk Management

Concept of risk, the measurement of risk in company, risk controlling, risk transfer, cost of risk, risk transfer, operational risk and risk audit

### Financial Management

Concept of financial management, financial market, basic of financial assessment, investment on real asset, risk on investment, practical approach in investment assessment, company's funding by capital market, capital market efficiency, capital structure

### Asset Management

Concept of asset management, the planning of asset management, asset purchasing, asset information system, administration and asset database, asset maintenance, evaluation and asset audit, system architecture for asset management, asset management software, asset mapping and tracking

### Service Management

Concept, types and classification of service, service strategy, system of service deliverance, service facilities and layout, concept of service quality and measurement, service culture, capacity management and demand, queuing management, service supply chain management, global service strategies

### Decision Support System

Basic concept of Decision Support System (DSS), types and stages of decision, types and characteristics of DSS, components that formulate DSS, modelling and model management, the design of DSS, methodology of DSS development, DSS implementation in terms of Industrial Engineering, concept and the utilization of group support system (GSS), concept and the utilization of executive information system (EIS)



## Industrial Marketing

The concept of marketing and marketing management, marketing plan and strategy, consumer's market analysis, industrial market analysis, market segmentation and target, position determination, price determination strategy, distribution channel and integrated logistics system, advertising and sales, e-marketing, the utilization of global market, market research.

## ❖ Field of Interest: Operational Research

### Six Sigma

Introduction: Definition of quality, control factor, noise factor, variation, defect system, concept of six sigma: true six sigma and Motorola six sigma, concept of DPMO, DMAIC (Define, Measure, Analyse, Improve, and Control), stages of quality control by using six sigma approach, tools in six sigma: SIPOC diagram (Supplier, Input, Process, Output, Customer), CTQ (Critical to Quality), Pareto diagram and control map. Process capability,

Kane performance index ( $C_{pk}$ ), Process Capability Index ( $C_{pmk}$ ), analysis of DPMO, Fishbone diagram, process stability, analysis 5 W + 2 H, project organizing of six sigma: leadership group, project sponsor and champion, implementation leader, master black belt, black belt, team members, dan process owner, implementation of six sigma in manufacturing, six sigma in service and concept of lean sigma

### Multivariate Analysis

Basic concept of multivariate analysis, the selection of multivariate analysis techniques, dependent technique: analysis of multiple linear regression, multiple linear regression coefficient, estimation and hypotheses: coefficient of regression and correlation of multiple linear coefficient, hypotheses test using ANOVA, Mechanical dependent: multiple discriminant analysis, Mechanical dependent: Multivariate Analysis of Variance (MANOVA) one line dan two lines, conjoint analysis, Mechanical interdependent: cluster analysis, multidimensional scaling and correspondence analysis, Introduction to Structural Equation Modelling (SEM), The confirmatory factor analysis SEM, Structural Model Testing SEM

### System Dynamics

Complex system & system thinking: Introduction, process for learning system dynamics, challenges in learning system dynamics, requirement for leaning system dynamics, important role of simulation in system dynamics: system dynamics application: Inventory and Supply Chain Management; modelling process: The objective of model, steps of modelling, overview of modelling process, structure and complex system behaviour: basic modus of dynamics system behaviour; Conceptual Model: Sub system diagram, Boundary chart diagram; Causal Loop Diagram (CLD): CLD notation, principles in CLD establishment, practice in generating CLD; Flow Diagram: Stocks,



Flow and accumulation, identification of stock and flow, interpreting CLD in flow diagram; tools in modelling the system dynamics; Delays, Coflows, Modelling Decision Making; Lab Works 1; building CLD and basic model using Powersim, Lab Works 2; building advance model using Powersim, Lab Works 3; building alternative model and simulation; validation and model testing: Boundary adequacy test, Structure assessment test, Dimensional consistency, Parameter assessment, Extreme condition test, Simulation and policy analysis

#### Quality Engineering

Basic concept of quality; types of quality control; concept of Taguchi; Taguchi experiment design; Hypotheses test: Normality test, homogeneity, analysis of variance; Taguchi experiment optimization method

#### Business Intelligent

Basic concept of business intelligent, the examples of business intelligent implementation and its benefits, entity-based modelling in business, the design of database for business transaction, pivot table as one of the tools in business intelligent, OLAP, application of data mining techniques in business intelligent

#### ❖ Field of Interest: Production System

##### Advanced Automation

Visual Programming (by using Java or C#), Serial Communication, Socket Programming, the introduction of basic level Arduino, Advance level Arduino programming, Sensor data reading system for basic level, Sensor data reading system for advance level, big project

##### Lean Manufacturing

Introduction, waste reduction thinking, lean manufacturing model, and lean thinking; implementation framework of lean manufacturing; Types of production waste, Identification method for production waste: waste relationship matrix, waste assessment; value stream analysis tools; value stream mapping; other lean tools; lean action plan, lean performance measurement, its application in industry

##### Halal Supply Chain Management

The scope of SCM and *halal* logistics: Principles and basic law of *Halal* SCM; Principle of *halal* logistic control; *SCM halal* resources; *SCM halal* business processes; *SCM Halal* Network Structure; *Halal* purchasing: process, strategy, and policy; *Halal* warehousing: receiving, put away, storage, order, and shipping *halal* goods; *Halal* transportation: preparation, loading, transport, documentation; *SCM Halal* Performance





### Intelligent Manufacturing System

Intelligent aspect in manufacturing system, database design for manufacturing system, SQL application in manufacturing system in DBMS, Knowledge extraction from manufacturing system database, Rule-based expert system application in manufacturing system, Fuzzy Logic application in manufacturing system, Artificial neural network in manufacturing system, genetic algorithm application in manufacturing system

### Sustainable Manufacturing

Introduction: history, triple bottom line concept, scope and impact: Issues and regulation on environmental impact; Implementation stages in sustainable manufacturing; Closed loop production: upgrading, reuse, recycle; Life cycle management: life cycle assessment, life cycle costing; Clean technologies: waste reduction, pollution prevention, renewable energy; Green product: renewable material, eco labelling; Application in industry

### Maintenance Management

Definition: basic concept and maintenance terminology. The policy and concept of maintenance management. Maintainability: related aspects, information system, analysis on maintenance technique. Reliability: active time and delay time on maintenance; down time, Maintenance hours factors (MHF); maintenance frequency factors (MFF); MTBM; MTBR. Supply support factor (SSF): considerations in spare part determination, factors that support SSF, considerations in purchasing, availability concept. Availability: related aspects, its role towards maintenance. Total productive Maintenance (TPM) – definition, objective and basic activities, the implementation stages, advantages and weaknesses and its implementation in industry

### Cellular Manufacturing System

The introduction of Cellular Manufacturing System, Part family formation, Part-machine group analysis, Similarity coefficient-based clustering, Mathematical programming and graph theoretic methods for cell formation, Novel methods for cell formation, Layout planning in cellular manufacturing, Scheduling Cellular Manufacturing Systems, Production planning in cellular manufacturing, Operating Manufacturing Cells with Labour Constraints

### Business Process Integration

Introduction to Configuration, Data in an ERP System, Configuration Phase I - Financial Accounting, Enterprise Structure, Configuration Phase II – Procurement, Business rules and parameters, Configuration Phase III – Fulfilment, Master data, Configuration Phase IV – Production, Process execution (testing) .

### Humanitarian Logistics

Disaster and disaster management, humanitarian logistics, humanity, readiness and challenges, coordination, information management, knowledge management, establishing the success of collaboration, case study

### CAD/ CAM/ CAE

CAD application and hardware, CI Data Creation, Post Processing and NC program verification, PC communication program using CNC, CAD/CAM/CAE in CIM (Computer Integrated Manufacturing), 2D 3D Wireframe geometry modelling and solid 3D model, IGES product data standard, PDES, STEP, CAD system application, Post Processing process, NC program verification process, the introduction to basic technique of Rs-232 Ethernet USB communication, the function of CAD/CAM/CAE and interface towards CIM

### Design Product & Development

This subject discusses the development of design concept, the organization of design, process of product design, market analysis, determination of product specification, development and concept selection, prototyping and feasibility analysis. This subject also explains about the latest product design methods, such as Quality function deployment, design for manufacturing, axiomatic method and TRIZ

### Logistic Management

Basic concept of logistics; the definition of logistic management, the role of logistics in company, integrated economics in logistic management, Channel of distribution, Customer service, Transportation and decision strategies in transportation. Warehousing and Material handling. Inventory Management. Managing material flow. Purchasing. order processing and information system. Global logistic

### ❖ Field of Interest: Ergonomics

#### Occupational Safety and Health

Introduction to OSH, basic law of OSH, Safety methodology, Types of hazard, the prevention and how to handle fire, Personal Protective Equipment / PPE, prevention, Safety and psychology, Occupational health & safety Management Systems (OSHMS), Accident causation and investigation, Cost/Benefit Analysis, examples of OSH implementation in company

#### Human Computer Interaction

The introduction of HCI, Human, Computer, Interaction, Interaction Plan, Universal Plan, User experience, Usability, Research method in HCI, Analysis Assignment



### Human Machine System

The introduction of Human Machine System, Human-centred design, Ergonomics integration in the design of human machine system, human mental ability, human information processing, user interface design (display and control), research plan, System concept & human error

### Industrial Ergonomic

The introduction to industrial ergonomics, musculoskeletal system and muscle; Anthropometrics; Biomechanics; Field lecture: Biomechanics; work physiology and work burden measurement; concept of material handling; physical work environment; temperature, sound. Light and vibration; Work rotation and workers' health; Contemporary topic: ergonomic industry program in industry

### Environmental Ergonomics

Ambient environment (Light): vision & visibility; light sources; Measuring Light: Introduction to Photometry; Thermal comfort; Thermal condition; Human vibration; Mechanic vibration; acoustic: Theory & Application; Noise at work

### Ergonomic Design for Special Purpose

Introduction ergonomic for special purpose; Universal design; 'Extra-ordinary' individuals and groups of people; Methods and assessment techniques; Principles of human factors engineering; Design for movement: with special solution for the very small and big, for those with lower back problems, and for bedridden persons; Ergonomics design for children: Products; Ergonomics design for children: Places; Ergonomics design for elder people; Ergonomics design for disable; Ergonomics design & maternity

### Cognitive Ergonomic

The introduction for cognitive ergonomics, Information Processing theory, Human cognitive abilities & limitations, Mental processes, Design of interfaces between humans and machine systems, Cognitive task analysis, Decision centred design, Technology & Design Induced Human Errors, Neuroergonomics, A safety perspective



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**International Program**  
Department of Industrial Engineering