



GUIDE BOOK

INDUSTRIAL TRAINING BACHELOR OF ENGINEERING

ACADEMIC, STUDENT'S AFFAIRS, ALUMNI AND
INDUSTRY & COMMUNITY RELATIONS SECTION
FACULTY OF ENGINEERING
UNIVERSITI PUTRA MALAYSIA

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SECTION I

INTRODUCTION

Industrial training is an extremely important and valuable asset in the teaching and learning process. A well planned and organized industrial training provides an added value to the students, as they are exposed to the on-job training and real life job experience.

The training is carried out and evaluated based on the course outcomes as outlined by the Faculty. It is important to let the students, visiting lecturers and the supervisor at the training place aware of the course outcomes and the objectives of the industrial training. Thus, the industrial training is a compulsory course for all students as part of the fulfillment in Bachelor of Engineering program. The duration of the training shall be 10 weeks.

1. Objective

The main objective of the industrial training which is done in the duration of 10 weeks is to provide **exposures of the industrial practices and ethics** to the students. During this training, students are exposed to:

- a) Role of an engineer in an engineering organization/company.
- b) Honing skills and professionalism including management and problem solving ability.
- c) Gain experience in oral and written communication as well as other transferable/common/core skills.
- d) The spirit of teamwork among the other working group members and instill communication skills in engineering which include daily interaction among the professionals and non-professionals within the working environment.
- e) The latest technologies or the real life working culture.

With the above mentioned exposure, students are expected to improve in the following aspects which are important such as:

- a) Critical analysis
- b) Produce good report writing
- c) Presentation skills
- d) Argue logically
- e) Interaction with other professionals
- f) Human skills and community expectation
- g) Awareness of contemporary issues

The training should not necessarily focus on the technical aspect only such as design and analysis/calculation in any specific area of specialization. The focus should also include on the development of ability, competency and interpersonal skills as a professional engineer as a whole.

2. Course Outcomes

The course outcomes outlined by the Faculty of Engineering for the industrial training are 9 out of the 14 course outcomes. At the end of the training, students are expected to:

- PO01: Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to the solution of complex engineering problems
- PO02: Identify, formulate, research literature and analyse complex engineering problem reaching substantiated conclusions using first principles of

mathematics, natural sciences and engineering sciences

- PO06: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations
- PO07: Apply reasoning informed by contextual knowledge to access societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice
- PO09: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice
- PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective report and design documentation, make effective presentations, and give and receive clear instructions
- PO11: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings
- PO12: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, to manage projects and in multidisciplinary environments
- PO14: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Apart from the above, students are expected to be able to:

- a) Describe the work they have been doing during the training
- b) Explain the experience they have gained during the training
- c) Apply theoretical knowledge and practical skill in solving engineering problems
- d) Communicate effectively with all level of staffs in the organization

3. Placement of the Training

Students are required to undergo the industrial training at the company vet through by the faculty. The industrial training coordinator will help in the application for the industrial training placement. The coordinator should be informed if the student wish to apply the training placement on his/her own or has been accepted by any of the company so that the faculty could issue a confirmation letter to the company.

4. Choice of the Training Placement

The industrial training coordinator will inform the students once they have been offered a place for the training. The students are encouraged to apply for the place of industrial training based on their area of specialization/interest, sponsorship, accommodation and their home town. During the training, the student's conduct must be in accordance with the organization working schemes, rules and regulations.

5. Placement of the Students

Once the placement is confirmed, a confirmation letter will be issued to the student. A copy of the letter will be given to the student's sponsor (if needed) and the residence college.

6. Duration of Training

Each student is required to undergo the training for duration of **10 weeks** of continuous practical training. The training starts from the first day the student report for duty at the company. At the end of 10th weeks the student is required to submit a final report of the industrial training to the relevant department.

7. Briefing to Students

A final briefing will be conducted for the students who have successfully obtained training placement before the training starts, possibly at the end of Semester 2. The briefing is to inform the students about their responsibilities during the training, problems that may arise and strategies to deal with any problems. The venue and the time for the briefing will be arranged by the coordinator.

The briefing should also include:

- a) Objective of industrial training
- b) Course outcomes at the end of training
- c) Evaluation
- d) Responsibility of the students

8. Briefing to Visiting Lecturers

Briefing to visiting lecturer should at least cover the following:

- a) Objectives of industrial training
- b) Program outcomes
- c) Assessment and other associated procedures
- d) Responsibilities of visiting lectures

9. Industrial Training Allowances

Allowance to student by the companies and government agencies are subjected to availability and not mandatory. The students may claim such allowances from their sponsoring organizations. Claim forms are readily available at the Students' Affair Department, UPM.

10. Insurance

Most employers would require students to have their own personal insurance for protection purposes while undergoing industrial training. All students are covered by earn insurance since they register in UPM.

11. Leave of Absence

Students should adhere to the training plan as programmed by the employers. Those who need a day off (for reasons other than sickness) that is truly unavoidable should apply for such leave beforehand. The industrial training coordinator should be informed. A note must be made in the Bachelor of Engineering Industrial Training Log form (FK4/Q/BLLATIN).

12. Change of Training Placement

Students are not allowed to change their training placement while in training. If a change of placement is absolutely necessary, the student should first discuss the issue with the coordinator and obtain written approval for a change of placement.

13. Lecturers' Visit To The Industrial Training Placements

- a) Visit by lecturers is to:
- b) Interact with students undertaking industrial training and discuss with the students and the officers in charge about the program and other associated matters. There will be two separate discussions. One between the lecturer and the student, and the other one would be between the lecturer and the coordinator. Students are expected to be prepared for the discussion.
- c) Visit former students who be working at the placement, to get feedback with regards to which courses by the faculty should be stressed more as a preparation to work in the company.
- d) Introduce available courses that are offered by the faculty to the officers at the placement, and to build a good relationship between the officers

- and the faculty.
- e) Foresee the possibility of student placements in the future.
 - f) Discuss the prospect of them accepting our graduates to work with them. Students and employers would be informed about the details of this visit.

14. Industrial Training Report

Students should prepare two (2) reports. The weekly work report is to be completed in the Bachelor of Engineering Industrial Training Log form (FK4/Q/BLLATIN). A copy of the weekly report should be sent to the respective industrial training coordinator every two reports should be sent to student's own industrial training coordinator every 2 weeks as a proof of student's training progress to the faculty. Students are responsible in making sure that reports are not kept too long by their employers. 3 copies of industrial training report, one for students themselves, one for the placement coordinator and the last one for the department. The report must be based on the industrial training report guide as provided in Section VI.

In addition to the 2 reports by students, the placement industrial training coordinator would also need to write a brief report that would be sent to the head of industrial training program coordinator. This report should be prepared in accordance with the industrial training evaluation form (FK4/Q/LATIN03).

15. Result of Industrial Training Assessment

Progress evaluation of students' industrial training is made based on report by visiting lecturers: visiting lecture is appointed by the head department to observe the progress of the student undergoing the industrial training. Lecturers are required to visit their students the latest by the end of the fifth week of training. The lecturers would then present 3 separate reports: LATIN02A (suitability of placement), and LATIN02B (effectiveness of training)

Report by the coordinator: industrial training coordinator would be evaluating student's learning progress based on observation throughout the training period. All observations are made towards the aim of students' achieving the learning objectives. The coordinator would fill in an evaluation form (LATIN03) at the end of the training period.

Report by students: every student is required to submit a training report 3 weeks after the training period has ended the latest. Format and details about the report is mentioned in LATIN04. The report would be evaluated by the visiting lecturer based on the Writing skills rubric, filled in the LATIN04 form.

Student's presentation: Every student is required to present his/her industrial training experience the latest by the end of the seventh week after the training period has ended. The industrial training coordinator will organize a session for the presentation. Evaluation of the presentation would also be made through the LATIN05 form based on the Oral Communication Skill Rubric.

Based on the evaluation mentioned above, result of the industrial training would be presented to students as: Satisfactory- students managed to obtain a mark of 50% and above. Unsatisfactory- students obtained a mark below 50%

Students are advised to focus on the report writing. The written report should be of professional quality and explains the learning experience achieved by the student. The training report should not be considered as a collection of forms, noted pictures with paged numbers and later compiled together. If the report is not of minimum standard, students would be asked to rewrite the report. It is reminded that industrial training is part of the requirement for a degree in the Bachelor of Engineering. Students are thus advised to take this training program seriously.

SECTION II

EXEMPTION FROM PERFORMING INDUSTRIAL TRAINING

Student who had worked in related engineering field for at least 12 months for the past 5 years and wish to get exemption from industrial training can submit an application following procedures written below:

1. Write a letter to head of department with following information:
 - a) Weeks of working
 - b) Begin and end date
 - c) Type and period of work (weeks)
 - d) Name and qualification of supervisors
 - e) Brief information of employer(s)
 - f) Projects involved (if any)
 - g) Employer's approval
 - h) Other information (if any)
2. Based on the information given, Head of Department or Industrial Training Coordinator will decide whether the applicant is qualified to submit a complete report for the exemption. Applicant will be informed later.
3. When the Head of Department or Industrial Training Coordinator had give an approval, student needs to fill in a form of '*Permohonan Pengecualian Latihan Industri (FK4/Q/LATIN05)*' and submit a report of job experience based on guidelines as in part V of this book. Student have to submit a full report to Head of Department or Industrial Training Coordinator in the first week of the next semester.
4. Industrial Training Coordinator review and remark on quality of the training and forward it to Head of Department for support and approval. '*Penilaian Laporan*' and '*Pembentangan Latihan Industri (FK4/Q/LATIN04)*' forms need to be completed for evaluation report.
5. Deputy Dean (Academic, Student's Affair, Alumni and Industry and Community Relations) evaluated and (in normal condition) give the result in two forms:
 - a) Approve Exemption Application
 - b) Reject Exemption Application

SECTION III

GUIDELINES FOR INDUSTRIAL TRAINING COORDINATOR

1. Responsibilities:

- a) To obtain and secure Industrial Training sites for students of that particular program
- b) To assign each student to a training site
- c) To coordinate onsite visit by lecturers at Industrial Training sites
- d) To coordinate the assessment of the Industrial Training report by visiting lecturers
- e) To coordinate the presentation of the Industrial Training report
- f) To process grades from the industry supervisor (50%); industrial training report (25%); and presentation of report (25%)
- g) To submit the result of the assessment to the Head of Department concerned at the specified time

2. Checklist

- a) Apply for Industrial Training sites and refer to attachment A to identify the appropriate fields for each engineering program
- b) Allocate training sites to students upon considering the following matter: The suitability of the Industrial Training nature and site for a student should be emphasized. Some of the training sites are not suitable for students with poor academic record. Students' financial and logistical needs are not priority, but they could be taken into consideration.
- c) Inform the student about their Industrial Training site.
- d) Perform the briefing to the student before end of the second semester. The briefing should include the explanation on the issues as follows:
 - i) Registration at the organization
 - ii) The way to complete the Industrial Training Log Book
 - iii) The frequency to submit the weekly report to the Coordinator/ Visiting Lecturer
 - iv) Industrial Training Report
 - v) Insurance
- e) Collect '**Pengesahan Laporan Diri**' form (OPR/TNC(JINM)/BR01/LI) (Week 1) from their employer. Should identify the agency which not return back the form and give them a reminder.
- f) Provide the list of Visiting Lecturer as a reference to the student.
- g) Industrial Training reports should be submitted by the student to the Department Administrative Assistant (PTJab). Help the PTJab to distribute the report to the related Visiting Lecturer.
- h) Process the marks from the industrial supervisor (50%); Industrial Training report (25%); report presentation (25%).
- i) List down the places which are not suitable to send the student.
- j) Accept the student's suggestion and opinion through the Visiting Lecturer (if any).
- k) Prepare the whole report through completion of Course Assessment Summary form (FK3/Q/CAS) and show them to the Head of Department for a discussion in the Department Meeting.

SECTION IV

GUIDELINES FOR A VISITING LECTURER

1. Get the list of students which are supposed to be visited from '(UPM/FK/(Jab))/(Kod Kursus)(No. Matrik)'
2. Make an appointment with the company before visiting. Please verify the appointment through fax or mail.
3. Obtain a permission from the Dean/Head of Department before visiting by filling up the form of 'Kelulusan Keluar Stesen Bertugas Rasmi/Lawatan/Membawa Kendaraan Sendiri' (BEN/BYR/B014) or airfare booking form if related.
4. Read the weekly report sent by students.
5. Bring those forms during the visit.
 - a) **Visiting Lecturer's Report - to be filled up by visiting lecturer (FK/ Q / LATIN02A)**
 - b) **Visiting Lecturer's Report - To be filled up by student (FK/ Q / LATIN02B)**
 - c) **Visiting Lecturer's Report - To be filled up by supervisor (FK/ Q / LATIN03)**
 - d) **Report Evaluation and Industrial Training Presentation (FK / Q / LATIN04)**
 - e) **Engineering Employer Survey form (FK5/ Q /EMPLOY)**
6. Execute the excursion to the organizations that have been previously agreed.
7. Discuss with the supervisor and the student separately if necessary.
8. Complete the relevant forms as listed in paragraph 5. Please make sure the forms are completed by the end of the Industrial Training period and keep them in the student's Industrial Training file.
9. Please make an evaluation according to the Report Evaluation and Industrial Training Presentation **(FK4/Q/LATIN04)** in a week time. The results are to be submitted to the Supervisor.

SECTION V

GUIDES FOR INDUSTRIAL TRAINING SUPERVISOR

1. Accept the UPM Engineering Faculty student by approving the Registration form using the **'Pengesahan Laporan Diri' (OPR/TNC(JINM)/BR01/LI)** form.
2. Prepare the exercise programmes for the student.

Notes: At the end of the industrial training programme, the student should have been exposed to the following aspects:

- a) communicate effectively with engineers, other professionals and community at large
 - b) analyse and interpret data
 - c) design and conduct experiment
 - d) use the skills, techniques and modern engineering tools for engineering practice
 - e) discuss the relevant contemporary issues
 - f) function effectively as an individual in a group
3. Approve the works done by the student every week using the **FK4 / Q / BLLATIN** form.
 4. Complete the student performance evaluation at the end of the industrial training using the form below:
 - a) **'Pengesahan Laporan Diri" - (OPR/TNC(JINM)/BR01/LI)**
 - b) **Visiting Lecturer's Report - (FK/Q/LATIN02A)**
 - c) **Student's Report - (FK/Q/LATIN02B)**
 - d) **Supervisor's Report -Industrial Training Evaluation - (FK/Q/LATIN03)**
 - e) **Evaluation and Industrial Training Presentation Report - (FK/Q/LATIN04)**
 - f) **Engineering Employer Survey form - (FK5/ Q /EMPLOY)**
 - g) **'Laporan Pelaksanaan Latihan Industri' - (OPR/TNC(JINM)/BR02/LI)**

SECTION VI

GUIDELINE FOR INDUSTRIAL TRAINING REPORT WRITING

1. Introduction

The purpose of Industrial Training is to practically expose students to the field of engineering. Through this exposure, students will have better understanding on the overall engineering practices and problems. This training is part of the learning curve. Therefore, exposure which increases the experience and knowledge is to be recorded in a form of organized report. This report allows the attained experience to be delivered to the public. Quality and neat report represents an organized, accurate and captivating training experience.

2. Objectives

- a. To record industrial training experience in a written form.
- b. To provide opportunity to students to summarize their respective experience.
- c. To apply the training knowledge for the preparation and writing of the final year project.

3. Report Format

It is recommended that the student's industrial training report is written using the guidelines given below.

Report

a. Title Page

Cover page is prepared by Faculty. This page should include the following information: title of project, full name of student, matric number, program and year of study. Attachment B shows the layout of this page.

b. Preface

Ideally the preface should cover:

- i) Technical tasks and projects.
- ii) Summary of report
- iii) Acknowledgement

The preface is limited to two pages. Please refer to Attachment C.

c. Table of Contents

This page is self-explanatory. Subdivision of headings should limited to three levels:

- i) Heading
- ii) Sub-heading
- iii) Page number

The Table of Contents lists in sequence all relevant subdivision of the report with their corresponding page numbers.

d. Company/ Organizational Background

A brief introduction to company structure is recommended as following:

- i) Organizational history
- ii) Organizational structure and hierarchy
- iii) Board of directors and management team
- iv) Other important details (not more than three pages)

- e. Summary of Tasks
This section consists of summary of tasks according to the weeks and activities carried out from the beginning until the end of industrial training (10 weeks or 24 weeks). Any absence during the training must be recorded and explained. Supporting letter should be included in the appendix.
- i. Work Experience
In this section, the student is required to explain the experience obtained during the training. Important details are:
 - i) Projects done
 - ii) Supervisory work
 - iii) Problems faced
 - iv) Problems solved
- f. Conclusion
This chapter is important since student gives an overall significant of summary about the industrial training. It should include:
 - i) The experience and knowledge attained
 - ii) Problems
 - iii) Opinions and suggestions
- g. References
The student should prepare a list of references if any relevant information or sources were used as references in the preparation of the report.
- h. Appendices
Any extra information to support the main text may be included as appendix. It should includes:
 - i) Weekly report
 - ii) Technical/ task report during training
 - iii) Technical drawing and others

5. Others

- a. Figures/ tables
All figures and tables must be properly labelled All figures and tables included in the repost must be explained in the text.
- b. Abbreviations
Abbreviations can be used in report writing after first listed in the text. All symbols and abbreviations for scientific terms as used in the report should be listed on the page after 'Table of Content' with their full interpretation given.

Each page should have a header and have been discussed in the text. They are numbered consecutively or according to the text.

Do not include or attach any irrelevant sources such as company brochures, request form, magazine of company and others.

ATTACHMENT A**Industrial training requirement according to undergraduate program****1. BACHELOR OF ENGINEERING (AEROSPACE)**

Industrial training for aerospace engineering is divided into two, which are:

- A. Aeronautics
 - a) Flight Mechanics
Related to flight testing activities for safe departure and landing
 - b) Aircraft Structure and Materials
Involves aircrafts' structure assembly and usage of materials. Parts of the materials are aluminium alloy, titanium alloy and composites.
 - c) Aerodynamics
Essential training in testing aircraft model or aircraft's parts using wind tunnel. To study properties like lift, drag and coefficient of drag.
 - d) Aircraft Design
Involves aircraft and aircraft's parts designing.
 - e) Air Transportation
Related with aircraft's repairing and maintenance including certification, air regulations, airport maintenance and scheduling.
- B. Aerospace System
 - a) Automatics Control
This Involves equipment handling system and aircraft's instrumentation. It also involves aircraft's control activities in cockpit.
 - b) Avionics
Related activities in this area include Flight Deck Layout and Display, Electronics, Communication, Navigation, FCS, Indicating and Recording, Electrical Power.
 - c) Propulsion
Activities include topic such as Engines, Fuel System, Auxiliary Power.
 - d) Fluid Mechanics
Activities associated with like hydraulic system, landing gear, pneumatics and air conditioning, oxygen and water/waste, fire protection.

2. BACHELOR OF ENGINEERING (CIVIL)

Industrial training for civil engineering is divided into six areas, which are:

- A. **Materials and Structure Engineering**
Activities include structure design in design office, checking design's budget, supervising construction and other related works such as budget, material's quantity and attending project meeting.
- B. **Geotechnical Engineering**
Site surveying works like preparing program for soil study, works in soil strength laboratory such as samples testing, analysis and basic designing.
- C. **Highway Engineering**
Involves road and highway design and road construction supervision such highway maintenance, design, traffic operation and management, public transportation and traffic loading.
- D. **Public Health Engineering**
Works involving design/construction of sewage line and treatment plant. Design and construction of water supply system, water quality testing and management works a treatment plants.
- E. **Water Sources Engineering**
Hydrology data collection, analysis and usage, planning, designing and maintaining of municipal drainage system, flood control, hydroelectric plant maintenance and water sources research works.
- F. **Construction Engineering**
Execution works and operation at construction site, management of construction materials and machinery including machine, labour, construction materials and others.

3. BACHELOR OF ENGINEERING (AGRICULTURAL AND BIOSYSTEM)

- A. Works related to agriculture machinery and equipment such as design, assembly, construction, operation, repairing and handling.
- B. Activities related to water and soil engineering; comprising water irrigation system, water control structure, hydrology, surveying for alignment of waterways and construction of country roads for development of agricultural area, checking tender specification, preparing contract's paperwork, offering tender and works supervision.
- C. Works related to agricultural products processing such as in factory and processing center including operation observation and coordination of process, repairing, handling and equipment testing, design and compatibility test for processing, administration and handling of materials for processing and storage.
- D. Consultancy work related to mechanical/civil/electrical engineering for agriculture-based project including designing infrastructure/facilities such as buildings, country roads and management of projects for agricultural development.

4. BACHELOR OF ENGINEERING (ELECTRIC AND ELECTRONIC)

Industrial training structure for this program is divided according to major fields in industry which are:

- A. Manufacturing of Electronics Component and Appliances.
- B. Consumer Services
- C. Research, Development and Consultancy.

The training structure for these fields is distinctive yet requires similar basic knowledge.

- A. Manufacturing of Electronics Component and Appliances.
This includes manufacturing of electronic components such as transistor, integrated circuit and electronic appliances such as radio, TV, telephone and computers. Suitable training includes:
 - a) Learning mass production system in terms of works, equipment and management
 - b) Maintenance of manufacturing equipment
 - c) Learning testing method at each manufacturing steps.
 - d) Conducting short term project related in the field. For example:
 - Manufacturing process survey
 - Automation process design
 - Product testing method design

- B. Consumer Services
This field includes the usage of computer in coordinating services such as process control, telecommunication, generating and delivering energy and traffic control. Suitable training includes:
 - a) Survey on the usage of computer in a service
 - b) Selection of suitable equipment in specific process.
 - c) Supervising equipment assembly and testing
 - d) System maintenance method
 - e) Conducting short term project related in the field. For example:
 - Appliance/package design using computer
 - Conduct testing on appliance
 - Preparation of specification for upgrading system
 - Conducting system research

- C. Research, Development and Consultancy.
This field includes research, design, electrical appliances testing, electronic and computer.
 - a) Learn appliance design method, circuit or IC with computer aid.
 - b) Conducting short term project in designing or searching data and analyzing research as part of big consultancy project.

5. BACHELOR OF ENGINEERING (CHEMICAL)

Industrial training in Chemical Engineering field covers following subdivision:-

- A. Chemical Processing Engineering
- B. Biochemical Engineering
- C. Environmental Engineering

Training in this field is to give some exposure to chemical engineering application in production industry such as gas processing, oil, petrochemical, toxic chemical, cement production and paint, solvent distillation, polymer industry, pharmaceutical, vitamin, and mineral, food industry and drink, alcohol production and acid bioorganic, or industry that use chemical engineering application in environment field such as air pollution control, water, and waste toxic, etc. Chemical engineering internship program focus on:

- a) Design chemical substance processing plant with process utility such as steam, boiler, furnace, high pressure, control device and other tank / processing plant for organic matter by using biochemistry process such as reactor fermentation / system or waste and waste treatment plant through use of chemical process and biochemistry.
- b) Design crop yield in industry by using bioprocess fermentation, or polymer reaction, pharmaceutical and food use chemical reaction and enzyme.
- c) Run process equipment such as generator, boiler, reactor, heat transfer and system tool condensation.
- d) Understand chemical substance processing operation such as solid, gas, and liquid/ biochemistry processing operation like microbe species usage in gas reaction and liquid.
- e) Control operation in production such as temperature, pressure, material mixing and reaction time in order to minimise waste and optimise the process.
- f) Handle materials which have fine particle and crystal shape. Mixture technology material, particle and transfer analysis material and process of applying high transmission of heat.
- g) Monitoring process and designing system in order to ensure that the waste production is minimised and recycling industrial waste.
- h) Using process equipment such as grease oil traps, coagulation process, sedimentation process, biofilter, colour treatment and others.
- i) Understanding the biochemical process operation in the waste treatment technology such as the use of microbe species and toxic materials degradation using biology.

6. BACHELOR OF ENGINEERING (MECHANICAL)

- A. **Research and Development**
In this field students will be able to do research works related to Mechanical and Manufacturing engineering. The training involved using new materials, inventory, control process, computer software in design and manufacturing. They will also do designing works that involve all important aspects related to sustainability, cost and manufacturing system.
- B. **Mechanical Engineering**
This field includes three main divisions which are services, manufacturing and contractor. Services includes transportation, energy, telecommunication and investment. Manufacturing division includes manufacturing, production and processing of a factory. Contractor includes producing works. Developing component and mechanical system.
- C. **Production Engineering**
Two main components in Production Engineering are Production Process and Production System.
In Production Process, students have the opportunity to expose themselves in:
- Control of material
 - Turning, milling, grinding
 - Casting, forging, extrusion, drawing, stamping, smelting, fabrication rolling and others.
- In Production System, students have the opportunity to expose themselves in:
- Mass Production
 - CNC/NC Machine Tools
 - Automation and Robotics and others
- D. **Industrial Engineering**
In this field students have the opportunity to expose themselves in:
- Design of plant layout
 - Material handling
 - Industrial management
 - Production/Operations management
 - Production planning and control
 - Industrial system analysis
- E. **Quality Control/ Quality Assurance**
Quality control involved controlling goods and services, controls of good in, control work in process, final inspection and testing of goods and ready services. Students will have the opportunity to use control charts, acceptance sampling, data analysis and others in real situation.
- F. **Design, Development and Testing**
Students will be exposed and engaged at the early stages to the process and design. Design works of the components such as mold and jig machines, production systems are considered suitable for this purpose.
- G. **Computer in Engineering**
Students undertaking training in this industry have the opportunity to gain further experience in using existing software packages in the analysis work and design engineering. Students can also create computer programs to solve specific problems.

7. BACHELOR OF ENGINEERING (PROCESS AND FOOD)

a. Objective

Bachelor of Engineering (Process and Food) Programme facilitates professionals in material process based on agriculture and biology, which include physical and design engineering processes, mass transfer process and design engineering, equipment process and control engineering, process reactor and design engineering.

b. Purpose

To prepare and cure biological/agricultural raw materials using advanced processes to convert into processed foods as well as utilising bio-products/agro-based materials as inputs for the production of consumer foods (food, pharmaceutical and industrial materials).

c. Basic

Bachelor of Engineering (Process and Food) curriculum is designed to focus on knowledge and skills in the integrated process and food engineering especially in processing biological/agricultural raw materials into consumer food. Also, such processes are done to produce pharmaceutical and industrial materials. Graduates from this programme can find career development opportunity in various relevant industries such as manufacturing/processing plant operation and management, engineering design (process, equipment and system design), product development and research.

To fulfill the demand in the food processing and agriculture based industries, Bachelor of Engineering (Process and Food) curriculum is designed to include two main options during the final year of study, i.e. Food and Bio-material Processing Engineering options. Food Engineering option focus to where the students are majoring in process operations of converting biological/agricultural raw materials into consumer food, and designing the process, equipment and process system using parallel control, and efficient energy management. While, Bio-material Processing Engineering option focus on the usage of principles and concept of the process engineering in biological/agricultural based industries, such as that are related to palm oil, rubber, cocoa, etc. Also, designing the process, equipment and process system using parallel control, and efficient energy management are included in the second option. Focus also been given in producing new products of food, pharmaceutical and industrial materials using the biological/agricultural raw materials.

Job Oppurtunity in Process And Food Engineering

a) Factory Operation and Management

Food and biological/agricultural raw materials processing factories need a lot of process engineers to handle production process based on operational unit and automatic process control. For such factory managements, engineers are needed to plan and design the facotry development based on product addition, production time line, certain production number and the factory operation analysis so that energy is efficiently used, process and sectors in transferring updated technology.

b) Product Development and Researches

Food are normally developed based on the consumers' need. Form time to time, new foods are developed in terms of form, taste, packaging and ingeredients, all to attract the interest of the consumers. Hence, there is a need for a process engineer to be involved in such activity to maintain the quality of the food while enhance the taste of the new products. Engineers are also needed to design proper machines and process involve so that the cost-effective foods are produced. With these kind of equipment, production could be easily increased while reducing the cost.

8. BACHELOR OF ENGINEERING (COMPUTER AND COMMUNICATION SYSTEMS)

Industrial training in Computer and Communication Systems Engineering have 4 fields:

- A. Computer Engineering
Training included:
- a) Design the computer hardware and software and their application
 - b) Install, maintain and develop computer systems
 - c) Trouble shoot the computer systems
 - d) Apply the available package in industry in analysis work and engineering design
 - e) Multimedia technology
- B. Computer Communication
This field included:
- a) Design, install, maintain telecommunication hardware
 - b) To learn about transmission line system, switching, and network planning
 - c) Learning fast network technology, multimedia, satellite communications, teleconference, and fibre optic and new usage in telecommunication industry
- C. Consumer Services
This field included the usage of computer in coordinating services such as process control, telecommunication, traffic control and others:
- a) Survey on the usage of computer in a service
 - b) Selection of suitable equipment in specific process
 - c) Supervising equipment assembly and testing
 - d) System maintenance method
- D. Research, Development and Consultancy
This field included research, design, development, and computer appliances testing:
- a) Learn appliance design method such as equipment, circuit or telecommunication system using the existing software packages in the industry
 - b) Conducting short term project in designing or searching data and analyzing research as part of big consultancy project

ATTACHMENT B



INDUSTRIAL TRAINING REPORT BACHELOR OF ENGINEERING

NAME :

MATRIX NO. :

PROGRAMME :

SESSION :



FACULTY OF ENGINEERING
UNIVERSITI PUTRA MALAYSIA
43400 UPM SERDANG. SELANGOR DARUL EHSAN

ATTACHMENT C

INTRODUCTION

Industrial Training has been done at Reserach Centre, Department of Irrigation and Drainage Ampang. Main activity of this centre is researches on trench, drain, river and port structures. Apart from that, this centre also provide consultations.

The following report describe the organization structures, activities and achievements of this centre. Duties will be detailed in terms of tables of training and duties and achievements. Details include every activity and problems occurred, job observation, problem solving which will be described in the following sections. Full report on a short term project that has been done is as in Appendixes I and II. Other information are also included.

Appreciation to the Director, Department of Irrigation and Drainage on the given opportunity so that the Industrial Training could be done there. Also, a special thanks to all the Industrial Training supervisors, i.e. Ir. Affendi Murthy Lowe, Ir. Redzuan Husin and Mr. Fadzil Mohamed on their guidances, reprimands and help during the training. Thanks to all the officers at the centre as well. Last but not least, to the Faculty of Engineering and the visiting lecturer where the visit is well planned.