

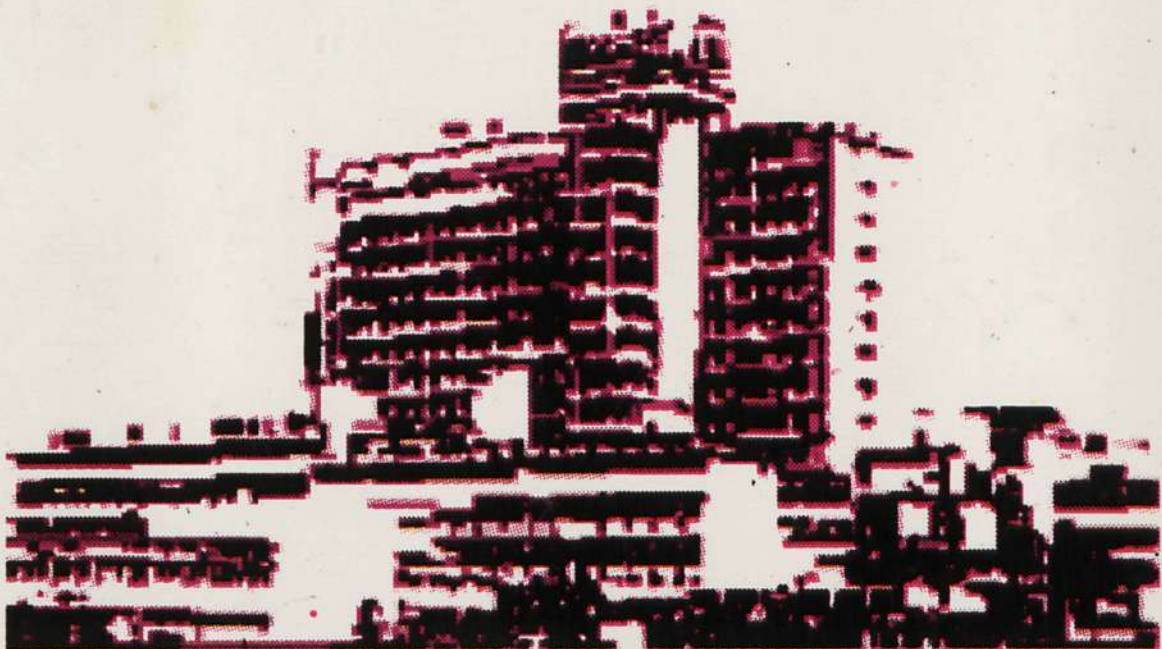
1995/96

# PROSPECTUS



اينستيتوت تيكنولوگي مارل  
INSTITUT TEKNOLOGI MARA

SCHOOL OF APPLIED SCIENCES



**PROSPECTUS**  
**SCHOOL OF APPLIED SCIENCES**  
**1995/96**

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## PROSPECTUS SCHOOL OF APPLIED SCIENCES 1995/96

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**INSTITUT TEKNOLOGI MARA**  
**40450 SHAH ALAM**  
**SELANGOR DARUL EHSAN**  
**MALAYSIA**

# 1. SCHOOL OF APPLIED SCIENCES AT INSTITUT TEKNOLOGI MARA

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# 1. SCHOOL OF APPLIED SCIENCES AT INSTITUT TEKNOLOGI MARA

## BACKGROUND

The school of Applied Sciences was established in 1967 in the ITM campus in Jalan Othman, Petaling Jaya. The school started with the Diploma in Planting Industry Management course to train personnel in management for the planting industry to serve a need for manpower in the agriculture sector at that time. This was followed by the introduction of other courses. .

Course Code	Course	Year Started
AS 10	Diploma in Planting Industry Management	1967
AS 13	Diploma in Rubber & Plastic Technology	1968
AS 14	Diploma in Animal Health and Production	1968
AS 15	Diploma in Experimental Laboratory Technology	1968
AS 16	Diploma in Rubber and Plastic Technology	1970
AS 17	Diploma in Wood Technology	1972
AS 18	Diploma in Textile Technology	1973
AS 19	Diploma in Science	1972
AS 22	Advanced Diploma in Applied Chemistry	1992

1 & 2 These courses have now been taken over by Universiti Pertanian Malaysia (U.P.M.)

3 This course has been changed to the Diploma in Industrial Chemistry course

In 1972 the Diploma in Science course was started to replace the Higher School Certificate (H.S.C.) course and placed under the administration of the School of Applied Sciences. Following this, more courses were introduced :

Course Code	Course	Year Started
AS 20	Diploma in Microbiology	1972
AS 21	Diploma in Food Technology	1972
AS 23	Diploma in Wood Technology	1973
AS 24	Diploma in Textile Technology	1974
AS 25	Diploma in Fisheries	1975

In 1974, the School of Applied Sciences moved to Shah Alam. To increase the opportunity for students to be admitted for training in science and technology, student admission in July and January, i.e. 'double intake' was initiated.

In July 1992 the Advanced Diploma in Applied Chemistry course was started. This advanced course gives an opportunity to diploma graduates from the School of Applied Sciences to further their studies. The Advanced Diploma is equivalent to a Bachelor of Science (Honours) Degree.

Up to now the School of Applied Sciences has produced about 430 graduates in various fields of science and technology each year. In July 1995 a new course leading to an Advanced Diploma in Furniture Technology will be offered to diploma graduates.

## ACADEMIC PROGRAMME

At present the School of Applied Sciences offers eight diploma - level and two advanced - level courses. All these programmes are offered in ITM Shah Alam except the Diploma in Planting Industry Management and the Diploma in Science courses which are conducted only in the Branch Campuses in Pahang (Jengka) and Perlis (Arau) from July 1995.

### ACADEMIC PROGRAMMES

Course Code	Course	Length of Course (Years)
AS 10	Diploma in Planting Industry Management	3
AS 13	Diploma in Rubber & Plastic Technology	3
AS 14	Diploma in Microbiology	4
AS 15	Diploma in Industrial Chemistry	4
AS 16	Diploma in Food Technology	4
AS 17	Diploma in Wood Technolog	4
AS 18	Diploma in Textile Technology	3
AS 19	Diploma in Science	2½
AS 25	Advanced Diploma in Applied Chemistry	2
AS 27	Advanced Diploma in Furniture Technology	2

### ADMINISTRATIVE STAFF

The School is headed by a Dean, assisted by a Deputy Dean and Course Tutors, supported by an Assistant Registrar, an Assistant Bursar and an Executive Officer.

#### List of Administrative Officers in KSG

**Dean:** Dr. Sulong Ahmad Hj. Kamaruddin

Tel: 03-5564330

Fax: 03-5597681

**Deputy Dean:** Asiah Abdullah

#### Course Tutors

AS 10	Diploma in Planting Industry Management ITM Pahang ITM Perlis	Ahmed Azhar Jaafar Said Hamid
AS 13	Diploma in Rubber & Plastic Technology	Rahmah Mohammed

## Course Tutors

AS 14	Diploma in Microbiology	Debra Siru
AS 15	Diploma in Industrial Chemistry	Safaruddin Kamaruddin
AS 16	Diploma in Food Technology	Halimahton Zahrah Mohd Som
AS 17	Diploma in Wood Technology	Mansur Ahmad
AS 18	Diploma in Textile Technology	Salmiah Mohd. Nor
AS 19	Diploma in Science ITM Shah Alam ITM Pahang ITM Perlis	Khaw Siok Hooi Muhd. Supi b. Musa Mohd. Shukri Ismail
AS 25	Advanced Diploma in Applied Chemistry	Lee Kok Kheng
AS 27	Advanced Diploma in Furniture Technology	Dr. Suhaimi Muhammed

**Assistant Registrar:** Rusliah Abdul Wahab

**Senior Assistant Bursar:** Zainah Abu Bakar

**Executive Officer:** Wan Zainab Hussin

## STUDENTS

The total student enrolment in the School of Applied Sciences is approx. 1500. Student intake is twice a year, in July and in January. In general each course takes in about 25 students for each semester.

For the Diploma in Science course the campuses in Pahang and Perlis take in 60 students each.

## FACILITIES AVAILABLE

The School of Applied Sciences in Shah Alam is situated in a six-storey building and also occupies part of the former School of Architecture, Planning and Surveying Building and part of the former School of Applied Arts. The facilities provided by the school include:

Lecture Theatres	2
Lecture Rooms	25
Laboratories/Workshops	44
Conference Room	1
Seminar Room	1

## 2. QUALITY ASSURANCE : SYSTEM OF ACADEMIC ADVISERS

To provide advice on how to produce graduates who are capable, respected, independent, with the ability to compete and in demand by the private sector, the School of Applied Sciences has the services of a Panel of Academic Advisers.



This Panel consists of

- representatives from the private sector (50%),
- representatives from agencies involved in the development of Bumiputra entrepreneurs,
- permanent representatives from the Committee of the School of Applied Sciences,
- the Dean of the School of Applied Sciences

Among the duties of the Academic Advisers are:

- to give advice on the contents on the curriculum and ensuring that the contents are in line with current industrial development and needs,
- advising and helping the School to obtain places in suitable industries for lecturers and students to do their industrial training.

Only the Diploma in Science course has Academic Advisers composing of faculty members from the local Institutions of Higher Learning. These faculty members also provide service as External Examiners in monitoring the standard of the examinations, thus ensuring the quality of the students who will eventually extend their education in the universities locally or abroad.

The Advanced Diploma in Applied Chemistry course has Academic Advisors from local industry and External Examiners from universities overseas to ensure a high academic standard for the graduates.

## List of Academic Advisers and/or External Examiners

### Diploma in Planting Industry Management

- |  |   |
|--|---|
| i. Kasmuri Bin Sukardi<br>Golden Hope Plantations Bhd.<br>Tingkat 9-16 Menara PNB<br>201-A Jln Tun Razak<br>50400 Kuala Lumpur | ii. Nordin Bin Muhammad Salleh<br>No.8,Lorong 1M 5/5<br>Bandar Indera Mahkota<br>25200 Kuantan<br>Pahang Darul Makmur |
|--|---|

### Diploma in Rubber and Plastic Technology

- |  |   |
|--|---|
| i. Abd. Najid b. Dato' Hj. Tajudin<br>Quality Assurance Manager<br>Sime Darby Malaysia Region<br>Tingkat 19<br>WISMA Sime Darby<br>Jalan Raja Laut<br>50350 Kuala Lumpur | ii. Tharumarajan M.<br>Senior Manager<br>Fujitsu Component (M) Sdn. Bhd.<br>1, Lorong Satu<br>Kawasan Perindustrian Parit Raja<br>86400 Batu Pahat<br>Johor |
|--|---|

### Diploma in Microbiology

- |   |  |
|---|--|
| i. Dr. Ahmad Zamzam Mohamed<br>Pengarah<br>Bahagian Penyelidikan Asas<br>MARDI<br>43400 Serdang<br>Selangor Darul Ehsan | ii. Dr. R. Alagaratnam<br>Director<br>Enzyme Technics<br>11, Jalan SS 15/4C<br>47500 Subang Jaya<br>Selangor Darul Ehsan |
|---|--|

## Diploma in Industrial Chemistry

- i. Dr. Ahmad b. Ibrahim  
Director  
(Marketing and Promotion)  
Malaysian Palm Oil Promotion  
Council (MPOPC)  
Kuala Lumpur
- ii. Dr. Syed Nur Azman b. Syed Mustaffa  
Assistant Technical Manager  
Fosroc Expandite Sdn. Bhd.  
Shah Alam

## Diploma in Food Technology

- ii. Foo Sai Lee  
Quality Control Manager  
CPC/AJI (M) Sdn. Bhd.  
Lot 1989, Blok C  
Jalan Segambut  
51200 Kuala Lumpur
- ii. Ibrahim Hj. Ahmad Badawi  
Executive Chairman  
Dewina Food Industries Sdn. Bhd.  
Lot 11, Jalan P/9B  
Kawasan Perindustrian Bandar Baru Bangi,  
43000 Kajang  
Selangor
- iii. Lam Ah Chye  
Quality Assurance Manager  
Nestle (M) Sdn. Bhd.  
Plaza Resource  
4, Lorong Persiaran Barat  
P.O. Box 385  
Petaling Jaya

## Diploma in Wood Technology

- i. Ghazali b. Awang  
General Manager  
Permint Plywood Sdn. Bhd.  
66/2 Mezzanine Floor  
Taman Sri Intan  
Jalan Sultan Omar  
20300 Kuala Terengganu
- ii. Amshah b. Murset  
Product Group Manager  
Dynochem (M) Sdn. Bhd.  
Lot 115, Senawang Industrial Estate  
70450 Seremban  
Negeri Sembilan
- iii. Chew Lye Teng  
Technical Director  
The Malaysian Timber Industry  
Board (MTIB)  
Blok A-S, Anjung Felda  
Jalan Maktab  
P.O. Box 10887  
50728 Kuala Lumpur

## Diploma in Textile Technology

- i. Sharifuddin b. Mohamad  
General Manager  
KIMA Sdn. Bhd.  
P.O. Box 3  
Sungai Chua  
43007 Kajang  
Selangor Darul Ehsan
- ii. Abdul Hamid b. Abdul Majid  
General Manager  
Arab Malaysian Development Berhad  
19th Floor  
AMDB Building  
No. 1, Jln Lumut  
50400 Kuala Lumpur

## Diploma in Science

### 1. Biology

- i. Assoc. Prof. Dr. Abdul Jalil b. Abd. Kader  
Deputy Dean  
Department of Microbiology  
Faculty of Life Sciences  
Universiti Kebangsaan Malaysia  
43600 Bangi  
Selangor Darul Ehsan

### 2. Chemistry

- i. Prof. Dr. Nordin Hj. Lajis  
Deputy Dean  
Faculty of Science and Environmental Studies  
Universiti Pertanian Malaysia  
43400 Serdang  
Selangor Darul Ehsan

### 3. Mathematics

- i. Prof. Dr. Abu Osman Md. Tap  
Faculty of Science, Mathematics & Computers  
Universiti Kebangsaan Malaysia  
43600 Bangi  
Selangor

### 4. Physics

- i. Dr. Muhamad Rasat Muhamad  
Dean  
Faculty of Science  
Universiti Malaya  
59100 Kuala Lumpur

## Advanced Diploma in Applied Chemistry

- i. Prof. M.B. Evans  
Head  
Division of Chemical Sciences  
University of Hertfordshire  
Hatfield Campus  
College Lane  
Hatfield Herts  
AL10 9AB  
United Kingdom

- ii. Dr. K. R. Cliffe  
Department of Mechanical & Process Engineering  
Chemical Engineering & Fuel Technology  
University of Sheffield  
P.O. Box 600  
Mappin Street  
Sheffield S1 4DU  
United Kingdom

## Advanced Diploma in Furniture Technology

- i. Ghazali b. Awang  
General Manager  
Permint Plywood Sdn. Bhd.  
66/2 Mezzanine Floor  
Taman Sri Intan  
Jalan Sultan Omar  
20300 Kuala Terengganu

- ii. Amshah b. Murset  
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Negeri Sembilan

- iii. Chew Lye Teng  
Technical Director  
The Malaysian Timber Industry Board (MTIB)  
Blok A-S, Anjung Felda  
Jalan Maktab  
P.O. Box 10887  
50728 Kuala Lumpur

### 3. SYSTEM OF TUTOR-TUTEE

The Tutor-Tutee System was initiated in Institut Teknologi MARA with the following objectives,

- to encourage closer ties between students and the teaching staff,
- to encourage the formation of 'a family unit' comprising students, lecturers and staff of ITM,
- to help students to develop themselves positively while in ITM,
- to guide and help students in solving their personal and academic problems.

In implementing the above, each student will be assigned a tutor from the day he joins ITM until the day he leaves. The Course Tutor will choose a tutor for each student and keep his records in the department for reference.

### 4. ADMISSION REQUIREMENTS

#### ADMISSION REQUIREMENT FOR DIPLOMA COURSES

A pass in SPM/SPM(V) with the following results:

- . Passes in Bahasa Malaysia and English Language
- . A credit in Mathematics
- . Credits in any two (2) of the following subjects:
  1. Biology
  2. Chemistry
  3. Physics
  4. Additional Science
  5. Additional Mathematics
  6. Science
  7. Engineering Technology
  8. Agricultural Science

#### **For 4 year courses**

Candidates who obtain C4 or better in Mathematics and any two (2) Pure Science subjects may be exempted from the first year.

#### ADMISSION REQUIREMENT FOR ADVANCED DIPLOMA IN APPLIED CHEMISTRY

Holders of ITM Diploma or equivalent

Cumulative Grade Point Average (CGPA) = or > 2.50 in Chemistry or related areas

#### **Additional Requirement:**

Candidates must pass an interview.

#### **Note:**

Consideration will be given to candidates with CGPA < 2.50 if they have related experience of not less than 2 years.

Holders of Diploma other than those mentioned above will be considered with the condition that they pass the Pre-Advanced Course of the School of Applied Sciences.

**ADMISSION REQUIREMENT FOR ADVANCED DIPLOMA IN FURNITURE TECHNOLOGY**

Holders of ITM Diploma or equivalent from other Institutions of Higher Learning.  
 Preference will be given to holders of diploma in the following fields :-

- Wood Technology
- Forestry
- Rubber/Plastic Technology
- Textile Technology
- Civil Engineering
- Mechanical Engineering
- Industrial Design
- Manufacturing
- Business Management
- Marketing/Accounting
- Science and Technology

Note :

Transfer of credit will be considered where suitable

Candidates will be interviewed.

**5. SYSTEM OF EVALUATION**

The Grade Point Average System is used for assessing the performance of a student based on continuous evaluation and a final examination at the end of each semester. This enables the performance and knowledge acquired by each student in each semester to be evaluated systematically.

Using this system, a measurement of performance is used to determine the Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

Within each course the lecturer determines the basis for evaluation. Grades (indicated by letters of the alphabet) earn the indicated number of grade points per credit hour and are recorded as follows:

GRADE	COMMENTS	GRADE POINTS
A+	Pass With Distinction	4.00
A		4.00
A-		3.67
B+	Pass with Credit	3.33
B		3.00
B-		2.67
C+	Pass	2.33
C		2.00
C-	Minimum Passing (no need to repeat if subject is not core but needs to be repeated if core)	1.67
D+		1.33
D		1.00
E	Failed	0.67
F		0.00

## Grade Point Average (GPA)

The GPA is calculated by multiplying Credit hours attempted for each subject by the numeric value of the grade received; this determines the number of grade points earned. The total grade points are then divided by the total number of credit hours for the semester. (Note: GPA hours include all subjects in which grades of 'A', 'B', 'C', 'D', 'E' and 'F,' are received).

$$\text{GPA} = \frac{\text{Total Credit Points Earned (Credit Hours x Grade Points)}}{\text{Total Credit Hours attempted}}$$

## Cumulative Grade Point Average (CGPA)

The CGPA is based on all coursework taken in the Programme.

$$\text{CGPA} = \frac{\text{Total Credit Points Earned of all Semesters}}{\text{Total Credit Hours Attempted for all semesters}}$$

### Example of GPA

#### SEMESTER 1

Subject Code	CodeCredit	Hour Grade	PointCredit Point (Credit Hour x Grade Point)
BIO 103	04	3.33	13.32
MAT113	04	2.67	10.68
PHY104	04	4.00	16.00
CHM128	04	3.33	13.32
UIS101	02	1.67	3.34
KKR100	01	4.00	4.00
ENL182	03	2.00	6.00
<b>Total</b>	<b>22</b>		<b>66.66</b>

$$\text{GPA} = \frac{66.66}{22} = 3.03$$

### Example of CGPA

#### SEMESTER 2

Subject Code	Credit Hour	Grade Point	Credit Point (Credit Hour x Grade Point)
BIO 153	04	3.00	12.00
MAT163	04	4.00	16.00
PHY154	04	3.33	13.32
CHM158	04	3.67	14.68
UIS151	02	3.00	7.34
<b>Total</b>	<b>23</b>		<b>66.34</b>

$$\text{GPA} = \frac{66.34}{23} = 2.88$$

$$\text{CGPA} = \frac{66.66 + 66.34}{22 + 23} = 2.96$$

## Requirement for obtaining a Diploma

The student must have acquired a CGPA of at least 2.00 and passed in all his subjects. He must also have met all his course requirements.

## Period of Study in ITM

The maximum period allowed for extending his course of study is as follows:

For a course which is of more than 2 year duration, an extension of 2 semesters is allowed.

For a course which is of 2 years or less in duration, an extension of 1 semester is allowed.

## Academic Standards

### Record Review

At the end of every semester each student's grades will be evaluated to determine his/her progress towards meeting diploma requirements. Depending upon the outcome of this review, students may continue in good standing, placed on probation, or be suspended. The criteria for placing a student in a particular category are outlined briefly below.

### Dean's list

The Dean's List is a roster of superior scholars who complete 12 or more credit hours in any given semester and who achieve for that semester or Grade Point Average (GPA) of 3.50 or above. The students placed on this list will receive a congratulatory certificate from the Dean of the School of Applied Sciences recognizing their achievement.

### Director's List

The Director's List is a roster of superior scholars who complete their course with a Cumulative Grade Point Average (CGPA) of 3.50 or above for every semester and must not have repeated any subject and/or be under disciplinary action. Students who have to undergo Practical Training for one Semester must also pass their Practical Training.

## Unsatisfactory Performance

### a) Probation

Academic probation is a method of warning a student that his or her coursework is not acceptable to the programme. Students on academic probation are required to meet their Course Tutors/Lecturers or Mentors or academic advisors. At such appointments the advisor and the student will discuss why the student's performance has been poor and will develop a realistic plan aimed at improving the student's academic performance. A student is placed on academic probation when the student's Cumulative Grade Point Average (CGPA) is below 2.0

### b) Dismissal

A student is dismissed from the Institute when:-

- i) the student's CGPA is less than 1.60 (with the status G1); or
- ii) the student's CGPA is less than 1.80 after being given the the status Probation (with the status G2); or

- iii) the student's CGPA is less than 2.00 after being given the status Probation two consecutive times (with the status G3); or
- iv) the student fails in any subject for the third time (with the status G4); or
- v) the student exceeds the maximum Period of Study in ITM (see section on Period of Study in ITM).  
He is dismissed with the status G5; or
- vi) the student passes all subjects required by the course and fulfills all requirements of the course but fails to obtain a CGPA of 2.00 (with the status G6); or
- vii) the student did not sit for all the subjects in the examination that he has registered to take in any one semester without prior permission from the Institute (with the Status G7).

## 6. ACADEMIC REQUIREMENT

### Requirement of ITM

Every student is required to take and pass all subjects and activities as specified by the Institut.

### Requirement of the School of Applied Sciences

Every student is required to take and pass all subjects as listed by the School.

### Requirement of the Course

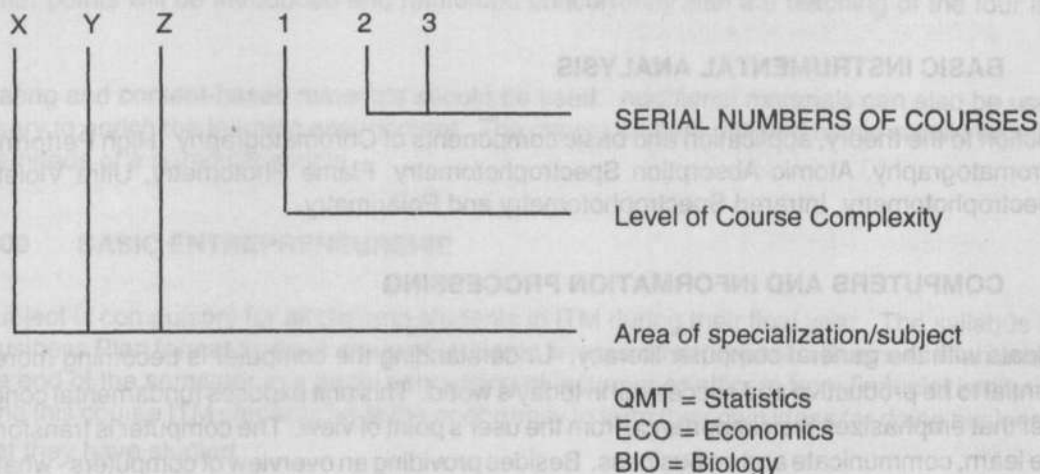
Every student is required to take and pass all subjects as listed by the Course.

### Co-curriculum Activities

Every student is required to take part in and pass in co-curriculum activities as specified by the Institut.

## 7. CODING SYSTEM OF SUBJECTS

Each course that is offered by the School has a unique code in the form of three letters of the alphabet, followed by three digits, e.g.





## 8. DESCRIPTION OF COMMON SUBJECTS

### BIO 105 BIOLOGY

This syllabus touches on the variety of forms in animals and plants. Apart from this a simple classification will be examined. Basic patterns for the organisation and adaptations in animals and plants will be emphasized.

### BIO 155 BIOLOGY

This syllabus covers the main processes of physiology in mammalian animals, especially man. In the Botany section, the morphology of the dicotyledonous and monocotyledonous plants are covered.

### CHM 107 BASIC CHEMISTRY I

This is the first of two parts towards providing a good foundation for physical and inorganic chemistry. This part covers atomic theory, stoichiometric equation, reactions of acids and bases, redox reactions and gas kinetic theory.

### CHM 157 BASIC CHEMISTRY II

This is the last part towards providing the foundation in physical and inorganic chemistry. This part covers atomic structure, periodic table, bonding, ionic theory, solutions and qualitative inorganic analysis.

### CHM 200 BASIC ORGANIC CHEMISTRY

This syllabus covers the naming, structures, bonding, reactions and uses of saturated, unsaturated and aromatic hydrocarbons, alkyl halides, hydroxy and carbonyl compounds and amines.

### CHM 203 PHYSICAL CHEMISTRY

The syllabus covers the study of chemical equilibrium, ionic equilibrium, salt hydrolysis and buffer systems, chemical kinetics, thermochemistry, phase equilibrium and colloid chemistry.

### CHM 256 BASIC ANALYTICAL CHEMISTRY

It covers the theory and practice of quantitative analytical chemistry. Topics included are evaluation of chemical data, sample treatment prior to analysis, calibration of volumetric glasswares, volumetric and gravimetric analysis and chromatography.

### CHM 305 BASIC INSTRUMENTAL ANALYSIS

An introduction to the theory, application and basic components of Chromatography. High Performance Liquid Chromatography, Atomic Absorption Spectrophotometry, Flame Photometry, Ultra Violet and Visible Spectrophotometry, Infrared Spectrophotometry and Polarimetry.

### CSC 133 COMPUTERS AND INFORMATION PROCESSING

The unit deals with the general computer literacy. Understanding the computer is becoming more and more essential to be productive and successful in today's world. This unit exposes fundamental concepts in a manner that emphasizes their importance from the user's point of view. The computer is transforming the way we learn, communicate and do business. Besides providing an overview of computers - what they

are, what they are doing, and what they can do, this unit also covers other aspects including computer security and ethics, modern trends and issues. The students are expected to have hands-on experience by using the popular application packages.

### **ECO 108 INTRODUCTION TO ECONOMICS**

Introduction to economics deals with the economic problem, supply and demand models, economic objectives, determination of income, money and financial sector and the international trade, in relation to the Malaysian economy.

### **ENL 120 FOUNDATION ENGLISH I**

Foundation English I is the first in a series of a three-level English programme for students of ITM. The course emphasises the learning of English in an integrated manner. Within each module of the instructional materials, the four language skills, reading, listening, speaking and writing are presented in context and are carefully integrated using a thematic approach. For vocabulary development, words selected from the reading passages are taught. In addition a list of 'confusibles' is included. Grammar is also taught in context as far as possible.

### **ENL 121 FOUNDATION ENGLISH II**

The Foundation English II course is for students who have gone through the Foundation English I course or who have attained the level of Foundation English II. It is designed to remedy students' weaknesses in the use of English to raise their proficiency level through the three main areas of:

1. Grammar and Writing
2. Reading Comprehension
3. Oral Communication

The materials used for the course are content based and cater to the needs of the various schools. They provide the basis for the learning of the four basic language skills namely: understanding, speaking, reading and writing.

### **ENL 230/231 INTERMEDIATE ENGLISH I & II**

Intermediate English is the final stage of the Foundation - Intermediate English programme. The course integrates the four language skills, namely: listening, speaking, reading and writing.

The main emphasis of the course is to develop the oral skills of the students.

Grammar points will be introduced and reinforced concurrently with the teaching of the four language skills.

Stimulating and content-based materials should be used. Additional materials can also be used when necessary to enrich the learning environment. The course content outlined below should be adapted to suit the needs of a particular school.

### **ETR 300 BASIC ENTREPRENEURSHIP**

This subject is compulsory for all diploma students in ITM during their final year. The syllabus is based on a Business Plan format as each group of students is required to prepare a Business Plan and present it at the end of the semester to a panel comprising of lecturers or officers from financial institutions. By following this course ITM students have the opportunity to form their own ideas for doing business based on what they have studied.

### **MAT 107 BASIC MATHEMATICS I**

This is a basic course in pure mathematics. It covers basic and general topics such as:- the number system, surds, indices, logarithms, set theory, functions, theory of quadratic equations, simultaneous equations, remainder and factor theorems, arithmetic and geometric progressions, permutation and combination, binomial theorem, coordinate geometry and laws reducible to a linear form.

### **MAT 157 BASIC MATHEMATICS II**

This is also a basic course in pure mathematics. It covers basic topics in trigonometry and calculus such as circular measure, trigonometrical ratios, fundamental identities, addition formulae, double and half angle, for formulae, solving trigonometric equations, limits, differentiation, application of derivatives, intergration, application of integration and basic linear.

### **MAT 207 ALGEBRA**

This is a course in advance algebra and covers topics such as elementary theory of equations, vectors, complex numbers, elementary matrix algebra and its application to solving linear simultaneous equation.

### **MAT 257 CALCULUS**

This is a course in calculus dealing mostly with differentiation and integration involving harder functions. The course covers topics such as inverse circular and hyperbolic functions, partial fractions, integration by substitution and integration by parts, differential equations and its application.

### **MAT 519 APPLIED MATHEMATICS FOR CHEMISTS**

This course covers many important topics needed for those going into engineering and science discipline. The topics include solving systems of linear equations, vector calculus, multiple integral, analytic complex functions. Fourier series, Laplace Transform, ordinary and partial differential equations.

### **MGT 126 INDUSTRIAL MANAGEMENT**

This is an introductory course in Industrial Management. It introduces to students the fundamental concepts of management and some elementary aspects of manufacturing management.

An overview of the field of manufacturing management is presented to give an introduction to the field and to serve as a foundation on which to build more advanced material in any area of specialisation.

The course is designed to provide students with enough managerial concepts and skills for them to appreciate the kind of work they would likely be involved in as managers.

### **MKT 117 INTRODUCTION TO MARKETING**

This subject is offered to students following the above mentioned courses with the main aim of introducing marketing concepts related to their areas of specialisation. The approach is more of a general introductory, rather than "managerial".

### **PHY 101 GENERAL PHYSICS I**

This physics course comprises of properties of matter and optic. In the properties of matter section, topics include unit, dimension, vector and scalar quantities, kinematic, Newton's laws of motion, conservation of energy and momentum, Archimedes's Principle, pressure, machine, surface tension, viscosity and elasticity. Optic section covers spherical mirror, refraction at plane surface; concave lens and convex lens, wave motion.

## **PHY 151 GENERAL PHYSICS II**

This physics course comprises of heat, electricity and magnetism and modern physics. In heat section, topics include first law of thermodynamic, thermometry, calorimetry, heat conduction and heat radiation. Electricity and magnetism covers electric field, electric potential, capacitance, Ohm's law, Kirchoff's laws, electric power, electromagnetic induction, direct current and alternating current. In the modern physics section, topics discussed are cathode rays, cathode ray oscilloscope, X-rays and radioactivity.

## **QMT 105 STATISTICS**

This is an introductory course in statistics. The course covers the basic concepts on probability theory, frequency distribution, measures of central tendency and dispersion, correlation and regression, time-series analysis and index numbers.

## **QMT 205 INDUSTRIAL STATISTICS**

This course covers the binomial distribution, Poisson distribution, normal distribution, expectation and confidence limits, elementary sampling theory and estimation theory: Hypothesis testing, analysis of variance. Also, basic principle of statistical quality control, charts for measurements and attributes, single and double plans for both acceptance and rectifying inspections and operating characteristics of sample scheme.

## **TIS 100 ISLAMIC CIVILIZATION I (HISTORY)**

This subject introduces to students the history of the birth of Islam and with Islam, Muslims achieved a high level of civilization in every aspects of life. It evolves on the development of Madinah City, which is not only a model city, but the first Islamic government that was formed. With this Islam spread all over the world, especially in the South-East Asian region.

## **TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)**

This subject explains to students the concept of 'Addin', religion, ideology and theory. Explanation of the concept will touch on characteristics, values, birth history and the purpose of the introduction. To really understand the concepts great emphasis on knowledge is important. Therefore the importance of education is highlighted, for only through education, an individual is able to understand the concepts effectively.

## **TIS 200 ISLAMIC CIVILIZATION III (ETHICS)**

This subject introduces to students the value of good manners and touches ethical questions according to Yunani's version. It also explains the difference between behaviour and moral and the relationship of behaviour towards religion, oneself and among mankind.

## **TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)**

This subject discusses on the Islamic concepts of jurisprudence, which touches on sources, its unique characteristics, constitutional history, basic principles of Islamic law and the influence of Islamic Law on judicial and legal system of Malaysia.

## **TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)**

This subject introduces the concept and the philosophy of an Islamic Political System. It emphasizes on three factors, that are the responsibility of rulers, the responsibility of Muslim and the responsibility of Non-Muslim in Islamic country, during the reign of Prophet Muhammad, his colleagues and 'tabiin'. It will also explain the influence of Islamic politics on the western world and South-East Asian region.

### **TIS 350 ISLAMIC CIVILIZATION VI (HUMANITIES)**

This subject explains on humanities with relation to science, social and economy. Each field will discuss on concepts, philosophy, history, its purpose and its well-known person. Discussion will be based on Islamic religion and connected to the South-East Asian region.

### **UIS 101 FOUNDATION OF ISLAM I**

This subject introduces the students to the foundation of Islam which touches on the question of faith (aqidah), its features and effects. It also discusses the concept of ignorance (jahiliah) and its features.

### **UIS 151 FOUNDATION OF ISLAM II**

A continuation of UIS 101. It discusses the concept of acts of devotion to Allah (ibadah) and its philosophy, the concept of Islamic mysticism (tasawwuf) and also the role and duties of man as messengers of Allah s.w.t. It also analyses the attributes of Islam as a way of life that is acceptable to all (Ad-Din) and its comparison with other religion. Finally, this subject covers the main sources of Islamic teaching.

### **UIS 201 CONTEMPORARY ISLAMIC THINKING**

This subject discusses the influences and effects of modern ideologies on the thinking of the followers of Islam today. It analyses from a comparative view point the concepts of Islamic morals (akhlaq), reconstruction of Islamic Society (Islah), the propagation of Islam (dakwah) and 'Jihad'. It also touches on the status and role of Muslim women, the concept of development and social change according to Islamic perspectives.

### **UIS 251 ISLAMIC HISTORY AND CIVILIZATION**

This subject clarifies the concept of Islamic civilization, its growth and its contribution to the development of science and intellectual activities in the world of Islam. It also discusses the changes brought about by Islam in the region which were influenced by Islam especially in the South-East Asian region.

### **UIS 303 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I**

This subject discusses the Islamic philosophy of science and technology according to Al-Quran and Al-Sunnah and its tradition which has existed in Islam. It also explains analytically the characteristic of Islamic science.

### **UIS 353 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II**

A continuation of UIS 303. It discusses problems on concepts and thoughts arising from modern science and explore contemporary thinking. It also explains the need of Islamic Science as an alternative.

### **ISLAMIC CIVILIZATION SUBJECTS: (FOR NON-MUSLIM STUDENTS)**

## 9. CURRICULA AND COURSE DESCRIPTIONS

### DIPLOMA IN PLANTING INDUSTRY MANAGEMENT

#### COURSE DESCRIPTION

The Diploma in Planting Industry Management was introduced at the School of Applied Sciences, Institut Teknologi MARA in 1967. The objective of this course is to train students specifically for positions in plantation management and to overcome the shortage of such personnel, especially Bumiputras. However, with rapid development in agriculture under the New Economic Policy, there is a need for trained management personnel not only in plantations but also in agricultural research institutions and other related organizations.

The course is now structured to cater for such a need. Students are tutored in basic sciences, agriculture, management and business, and are exposed to current agricultural management procedures.

This course is a full-time three-year or six-semester programme. In addition to the theoretical and laboratory work at the Institute, students are also required to undergo at least 20 weeks of practical training in plantations, agricultural research institutions, agricultural institutions and agricultural business organizations during semester vacations.

#### CAREER PROSPECTS

Graduates may find employment in the private sector or in government and semi-government bodies. In the private sector, graduates are mainly absorbed by the plantation industries and agriculture based industries such as Kumpulan Guthrie, Golden Hope Plantation, Boustead Holdings and Sime Darby. In government agencies or statutory bodies, graduates are employed as assistant research officers or farm managers. Certain banks and commercial companies may employ graduates as credit or marketing executives.

#### OPPORTUNITIES FOR FURTHER STUDIES

Graduates may also further their studies in the same or related fields at both local and foreign universities. Many graduates are now studying in U.P.M., U.U.M. and U.S.M. The duration of study depends on the university selected, field of study, and the graduate's achievement at the diploma level. For further studies in the same discipline in American universities, most graduates are absorbed directly into the third of final year bachelor degree programme.

#### FACILITIES AVAILABLE

The campuses offering the course are equipped with hundreds of acres of farm planted with various crops such as oil palm, rubber, fruit trees and vegetables. Besides these crops, livestock rearing facilities are also available. Students also will be able to work on sophisticated equipment in the science laboratories and agricultural engineering workshops.

**COURSE TUTOR:** Said Hamid

**ACADEMIC STAFF  
ITM PERLIS BRANCH CAMPUS**

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturer</b>			
1.	Abd. Rashid Said Asghar	M.Sc. MAMRD. (U. of Florida) B.Sc. Hons. (Louisiana State U.) Dip. Agric. (U.P.M.)	Horticulture & Agric. Management
2.	Dr. Harbant Singh	Ph.D. (U. of Manchester) M.Sc. (U. of Agric., Punjab) B.Sc. (U. of Agric., Punjab)	Crop. Protection
3.	Ismail Abdullah	M.Sc. Agric. (Ohio State U.) B.Sc. Agric. (Ohio State U.) D.P.I.M. (I.T.M.)	Agric. Economics
4.	Low Seng Mook @ Low Ah Mok	M.Sc. (U. of Texas, America) B.Agric. Hons (U.M.)	Agric. Engineering
5.	Wan Muda Wan Yahya	M.Sc. (U. of West Texas) B.Sc. Agric. (Louisiana State U.) Dip. Agric. (U.P.M.)	Weed Science
<b>Lecturers</b>			
1.	Abdul Satar Said Asghar	B.Sc. Agric. (U.P.M.)	Soil Science
2.	Ahmad Shafiai Uda Jaafar	B.Sc. Agric. (U.P.M.) Dip. Agric. (U.P.M.)	Crop. Protection
3.	Said Hamid	B.Sc. Agric. Hons. (U.P.M.)	Soil Science
4.	Zainah Jalil	B.Sc. Agric. (U.P.M.)	Soil Science

**COURSE TUTOR:** Ahmed Azhar Jaafar

**ACADEMIC STAFF  
ITM PAHANG BRANCH CAMPUS**

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturer</b>			
1.	Khalirruddin Ali	M.Sc. (U. of Northwest Missouri) B.Sc. (Iowa State U.) DPIM (I.T.M.)	Agronomy
<b>Lecturers</b>			
1.	Ahmed Azhar Jaafar	M.Sc. (U. of Tennessee) B.Sc. (Iowa State U.) Dip. Agric (U.P.M.)	Agronomy

No.	Name	Qualification	Area of Specialization
2.	Md. Jamaluddin Bula	M.Sc. (Sam Houston State U.) B.Sc. (U. of Southwestern Louisiana) DPIM (I.T.M.)	Agribusiness
3.	Mohd Fozi Ali	Bac. Eng. (U.P.M.)	Agricultural Engineering
4.	Noor Hishamuddin Sulaiman	B.Sc. (U.P.M.)	Agribusiness
5.	Wan Hanisah Wan Ismail	M.Sc. (U.P.M.) B.Sc. (U.P.M.)	Extension Education
6.	Zakaria Tajuddin	M.Sc. (Stephen F. Austin State U.) B.Sc. (Iowa State U.) Dip. Agric (U.P.M.) Dip. Translation (DBP & PPM)	Agriculture & Statistics

**CURRICULUM  
3 YEAR COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
AGR 172	PRINCIPLES OF AGRICULTURE	4	4	4	0
BIO 101	BIOLOGY	4	5	3	2
ENL 120	FOUNDATION ENGLISH I	2	4	4	0
UIS 101/ TIS 100	FOUNDATION OF ISLAM I / ISLAMIC CIVILIZATION I (HISTORY)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>13</b>	<b>17</b>	<b>13</b>	<b>4</b>

Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial



## YEAR 1

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
PHY 113	PHYSICS	4	5	3	2
CHM 106	CHEMISTRY	4	5	3	2
MAT 117	MATHEMATICS	3	3	3	0
ECO 107	PRINCIPLES OF ECONOMICS	4	4	4	0
ENL 121	FOUNDATION ENGLISH II	2	4	4	0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II / ISLAMIC CIVILIZATION II (THOUGHTS)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>20</b>	<b>25</b>	<b>19</b>	<b>6</b>

## YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
ECO 160	AGRICULTURAL ECONOMICS	4	4	4	0
ACC 109	ACCOUNTING	4	4	4	0
AGR 102	PLANT SCIENCE	4	5	3	2
AGR 107	PLANT PROTECTION I	4	5	3	2
QMT 108	BIOMETRY	3	3	3	0
ENL 230	INTERMEDIATE ENGLISH I	2	4	4	0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING III / ISLAMIC CIVILIZATION III (ETHICS)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	3
	<b>TOTAL</b>	<b>21</b>	<b>25</b>	<b>21</b>	<b>4</b>

Notes: Lect - Lecture, Lab./Lab. - Laboratory Work and/or Tutorial

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect. Lab./Tut.	
<b>Part 4</b>					
MGT 131	INDUSTRIAL RELATION	3	3	3	0
MGT 132	PERSONNEL MANAGEMENT	3	3	3	0
ACC 110	COSTING	4	4	4	0
AGR 156	SOIL SCIENCE I	4	5	3	2
AGR 159	CROP HUSBANDRY I	4	4	4	0
ENL 236	INTERMEDIATE ENGLISH II	2	4	4	0
UIS 251/ TIS 250	ISLAMIC HISTORY & CIVILIZATION IV / ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>22</b>	<b>26</b>	<b>22</b>	<b>4</b>

**YEAR 3**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
AGR 209	CROP HUSBANDRY II	4	4	4	0
AGR 260	AGRICULTURAL ENGINEERING I	4	5	3	2
AGR 206	SOIL SCIENCE II	4	5	3	2
ACC 215	MANAGEMENT ACCOUNTING	4	4	4	0
ETR 300	BASIC ENTREPRENEURSHIP	3	3	3	0
UIS 303/ TIS 300	HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I / ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	<b>TOTAL</b>	<b>21</b>	<b>23</b>	<b>19</b>	<b>4</b>

**Notes: Lect - Lecture, Lab./Lab. - Laboratory Work and/or Tutorial**

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
AGR 310	AGRICULTURE ENGINEERING II	5	5	3	2
AGR 262	AGRICULTURAL EXTENTION	3	3	3	0
MKT 165	AGRICULTURAL MARKETING	3	3	3	0
AGR 261	PLANT PROTECTION II	4	5	3	2
QMT 217	RESEARCH METHODS AND TECHNIQUES	3	3	3	0
	TOTAL	19	21	17	4
	<b>GRAND TOTAL</b>	<b>120</b>	<b>141</b>	<b>114</b>	<b>28</b>

Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## DESCRIPTION OF SUBJECTS

### YEAR 1 (3 YEAR COURSE)

#### AGR 172 PRINCIPLES OF AGRICULTURE

This is an introductory course in the principles of agriculture. It will introduce to the students the various aspects of agriculture viz., economics, estate management, soil science, plant pathology, entomology, crop husbandry, plant science and other agriculture related subjects.

#### BIO 101 BIOLOGY

This subject provides a broadbased knowledge in general biology so as to facilitate the understanding of subjects like plant science, plant protection, soil microbiology and crop husbandry.

#### \* ENL 120 FOUNDATION ENGLISH I

#### \* UIS 101/ FOUNDATION OF ISLAM I/

#### \* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)

#### PHY 113 PHYSICS

This subject provides the basic knowledge in physics so as to enable the students to follow subjects like agricultural engineering and soil science.

#### CHM 106 CHEMISTRY

This is a general course on chemistry which will provide the students with a general knowledge of the subject of chemistry which will serve as a foundation for soil science and other related subjects.

\* refer to page 12-16

## **MAT 117 MATHEMATICS**

This is an elementary subject on mathematics which will assist in the understanding of physics, chemistry and engineering calculations.

## **ECO 107 PRINCIPLES OF ECONOMICS**

This is an elementary course on economics which will help the students to understand the basic concepts, basic problems and their solutions in the Malaysian economy.

\* ENL 121 FOUNDATION ENGLISH II

\* UIS 151/ FOUNDATION OF ISLAM II/

\* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)

## **YEAR 2**

## **ECO 160 AGRICULTURAL ECONOMICS**

This is an introductory course in farm management that emphasises on the three basic functions - planning, control and implementation, with special reference to the concepts of decision making, intergrated approaches to managing productive resources, demonstrating the use of records and accounts in planning farm business.

## **ACC 109 ACCOUNTING**

This is an elementary course in accounting which emphasises on the principles, theory and practices in financial accounting.

## **AGR 102 PLANT SCIENCE**

This subject will provide to the students a general knowledge on the biology of important economical plants and weeds in Malaysia.

## **AGR 107 PLANT PROTECTION I (PLANT PATHOLOGY)**

This course will introduce the students to the concepts, causes and prevention of plant diseases.

## **QMT 108**

This is an elementary course in statistics which emphasises on data collection, correlation and regression.

\* ENL 230 INTERMEDIATE ENGLISH I

\* UIS 201/ CONTEMPORARY ISLAMIC THINKING III /

\* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

## **MGT 131 INDUSTRIAL RELATION**

This subjects exposes the students to the system of industrial relations and its importance with reference to Malaysian context.

\* refer to page 12-16

## MGT 132 PERSONNEL MANAGEMENT

This subject will discuss the principles and functions of personnel management in improving productivity in various organisations.

## ACC 110 COSTING

This subject explains the concepts, principles, and techniques of costing in accounting.

## AGR 156 SOIL SCIENCE I

This is an elementary course in soil science which stresses on the physical and chemical properties of soil.

## AGR 159 CROP HUSBANDRY

This subject discusses the husbandry (viz., planting, maintenance, and processing) of major crops in Malaysia like rubber, oil-palm, paddy and cocoa.

## \* ENL 236 INTERMEDIATE ENGLISH II

## \* UIS 251/ ISLAMIC HISTORY & CIVILIZATION IV /

## \* TIS 200 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

### YEAR 3

## AGR 209 CROP HUSBANDRY II

This subject discusses the husbandry (viz., planting, maintenance and processing) of secondary crops in Malaysia like vegetables, fruits, field crops, beverages and spices.

## AGR 260 AGRICULTURAL ENGINEERING I

This is an introductory course in farm mechanisation dealing with the construction maintenance and operation of the farm tractor; and other farm machinery.

## AGR 206 SOIL SCIENCE II

This subject deals with soil management with special reference to : soil microbiology, application of fertilizers, soil survey and classification; and soil and water conservation.

## ACC 215 MANAGEMENT ACCOUNTING

This subject discusses the concepts and basic principles of management of accounting especially on the management of capital for decision making in business, planning and control.

## \* ETR 300 BASIC ENTREPRENEURSHIP

## \* UIS 303/ HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I /

## \* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

\* refer to page 12-16

## AGR 310 AGRICULTURE ENGINEERING II

This is an elementary course in land survey and irrigation.

## AGR 262 AGRICULTURAL EXTENTION

This is an introductory course in agricultural extension with special reference to : social and cultural factors in extension dissemination of information, and techniques used in extension.

## MKT.165 AGRICULTURAL MARKETING

This subject discusses the concept, processes and activities of marketing agriculture produce. The application of this subject under real situation is also taught to the students.

## AGR 261 PLANT PROTECTION II

This is an elementary course on Entomology which discusses the identification of insect pests and their control.

## QMT 217 RESEARCH METHODS AND TECHNIQUES

This subject deals with statistical techniques and evaluations used in field experimentation.

Contract Lecturer

Dr. M. M. Yusoff  
Dr. M. M. Yusoff  
Dr. M. M. Yusoff

Graduates from the course are directly accepted into the second year of the Bachelor of Engineering programme by the University of Hull, London U.K. to pursue their polymer technology degree. Other overseas universities may accept them directly into second year of their degree programme. (A. M. M. Yusoff, U.S.M., U.T.M., and U.K.M.)

## FACILITIES AVAILABLE

The laboratory and workshop are fully equipped with analytical instruments, processing equipments and mechanical tools. The workshop is equipped with two injection moulding machines, extrusion and film blowing machine, two roll mills, four hot presses, ball mill, extruder, the monitoring machine and others. The laboratory includes physical testing laboratory, polymer chemistry laboratory and analytical laboratory. Some of the instruments available (not to mention a few are tenonmeter, Monsanto Rheometer, Melt flow indexer, gel permeation chromatography, GC, HPLC, DSC, IR etc.

\* refer to page 12-16

# **DIPLOMA IN RUBBER AND PLASTICS TECHNOLOGY & DIPLOMA IN NATURAL RUBBER PROCESSING**

## **COURSE DESCRIPTION**

Since the introduction of the first synthetic polymer in the late 19th century, the polymer industry has grown tremendously and polymers have become the essential material in the modern world. The consumption of these polymeric materials is expected to surpass or even replace the conventional materials such as ceramics, metals and alloys. Hence, there is a need for trained polymer technologists in the manufacture, design and application of these polymeric materials. This course provides a training ground for rubber as well as plastics technologists.

The scope of this training covers the principles and operation of machines, characterisation, instrumentation, fabrication processes and compounding of polymeric materials. The course is intended to provide education opportunities to those with SPM qualifications and to train them to a sub-professional level in rubber and plastics technology. Students are required to undergo a period of practical training in RRIM and also factory attachment in order to obtain the Diploma in Natural Rubber Processing awarded by RRIM.

The first two semesters involve teaching of basic sciences so as to strengthen the science foundation of the students. Natural rubber processing and polymer chemistry are introduced in the second year. In the final year, the subjects taught are, mainly the rubber and plastics specialisation areas. The natural rubber processing practical training program will be conducted during the end of the second year. Students are expected to do projects related to their studies in the final semester of the course.

Students are also sent to the various polymer based industries to do their practical training to gain industrial experience. Students who pass will be awarded two diplomas as agreed since 1985 under joint program Diploma in Rubber and Plastics Technology & Diploma in Natural Rubber Processing. This dual diploma will certainly enhance the graduate's job opportunities in both the private and public sectors.

## **CAREER PROSPECTS**

This Diploma is recognised by the Malaysian government. Graduates from the course secured good jobs in multi-national companies like Good year, Bata, Dunlop Industries, Heveafield, Behn Meyer, Bayer as well as local plastic industries such as EP Polymer, Usra Tampi, Perlis Consolidated Co. and Titan Groups. Graduates from the course may also find employment as laboratory technicians, quality control officers, production supervisors in various polymer related factories or even as heads of production and factory managers.

## **OPPORTUNITIES FOR FURTHER STUDIES**

Graduates from the course are directly accepted into the second year of the Bachelor of Engineering programme by the University of North London U.K. to pursue their polymer technology course. Other overseas universities may accept them directly into second year of their degree programme i.e. Manchester Metropolitan University and Sheffield University, UK. They may also further their studies to a degree level at local universities, such as U.S.M., U.T.M. and U.K.M.

## **FACILITIES AVAILABLE**

The laboratories and workshop are fully equipped with physical testing equipments, processing equipments and machineries.

The workshop is equipped with two injection moulding machines, extrusion and film blowing machine, five two-roll mills, four hot presses, ball-mill, autoclave, thermoforming machine and others.

The laboratories include physical testing laboratory, polymer chemistry laboratory and analytical laboratory. Some of the instruments available, just to mention a few, are tensometer, Monsanto Rheometer, Melt flow indexer, gel permeation chromatograph, GC, HPLC, DSC, IR etc.

**ACADEMIC STAFF**

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturer</b>			
1.	Asiah Abdullah	M.Sc. (UM) B.Sc. Hons. (National College Rubber Tech.) D.R.P.T. (ITM)	Polymer Sci. & Tech. Polymer Sci. & Tech.
2.	Mohd Hanafiah Abidin	M.Sc. (U. Warwick) B.Sc. Hons. (U.M.) Dip. Prod. (U.Strathclyde)	Manufac. Sys. Eng. Mathematic Prod. Eng. & Mgt.
3.	Saw Eng Kar	Assoc. Natural College Rubber Tech. Grad. Plastics Rubber Tech. B.Sc. (U. Nanyang)	Polymer Technology Chemistry
<b>Lecturers</b>			
1.	Abdul Roni @ Yusoff	B.Sc. Hons. (U.S.M.)	Polymer Technology
2.	Dzaraini Kamarun	M.Sc. (East Michigan U.) B.Sc. Hons. (U.M.)	Polymer Technology Chemistry
3.	Mohd Muhiddin Ahmad	M.Sc. (National College Rubber Tech.) B.Sc. Hons. (U. Brunel) Member Plastics Rubber Inst. D.R.P.T. (ITM)	Polymer Sci. & Tech. Polymer Sci. & Tech
4.	Nawawi Abd. Rahman	B.Sc. Hons. (Poly. North London) Assoc. London School and Plastics Technology D.R.P.T. (ITM)	Polymer Technology
5.	Rahmah Mohamed	M.Sc. (Loughborough U.) B.Sc. Hons. (U. Wales Inst. Sc. Tech.) Grad. Plastics Rubber Inst.	Polymer Technology Polymer Chem.Tech.
6.	Rozana Mohd Dahan	B.Sc. (U.M.)	Physics
7.	Zuraidah Yaakub	B.Sc. Hons. (U.S.M.)	Polymer Technology
<b>Contract Lecturer</b>			
1.	Lee Kok Keong	M.Sc. Eng. (London U.) D.I.C. (Dip. Imperial Coll.) G.R.P.I. (Grad. Rubber & Plastics Instit.) B.Sc. Hons (U.M.)	Polymer Engineering Applied Mechanics Plastics Technology Physics



**CURRICULUM**  
**3 YEAR COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
CHM 107	BASIC CHEMISTRY I	4	5	3	0
PHY 101	GENERAL PHYSICS I	4	5	3	2
MAT 107	BASIC MATHEMATICS I	4	4	4	0
MEN 120	TECHNICAL DRAWINGS	2	4	0	4
ENL 120	FOUNDATION ENGLISH I	2	4	4	0
UIS 101/ TIS 100	FOUNDATION OF ISLAM I / ISLAMIC CIVILIZATION I (HISTORY)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>19</b>	<b>26</b>	<b>16</b>	<b>10</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
ECO 108	INTRO. TO ECONOMICS	3	3	3	0
CHM 157	BASIC CHEMISTRY II	4	5	3	2
PHY 151	GENERAL PHYSICS II	4	5	3	2
MAT 157	BASIC MATHEMATICS II	4	4	4	0
CSC 102	INTRO. TO COMPUTER SCIENCE	3	4	2	2
ENL 121	FOUNDATION ENGLISH II	2	4	4	0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II / ISLAMIC CIVILIZATION II (THOUGHTS)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>23</b>	<b>29</b>	<b>21</b>	<b>8</b>

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
CHM 200	BASIC ORGANIC CHEMISTRY	4	5	3	2
QMT 105	BASIC STATISTICS	3	3	3	0
MAT 207	ALGEBRA	3	3	3	0
RPT 104	PROCESSING OF CONVENTIONAL NR	3	3	3	0
ENL 230	INTERMEDIATE ENGLISH I	2	4	4	0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING III / ISLAMIC CIVILIZATION III (ETHICS)	2	2	2	0
ETR 300	BASIC ENTREPRENEURSHIP	3	3	3	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>25</b>	<b>21</b>	<b>4</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
CHM 203	BASIC PHYSICAL CHEMISTRY	4	5	3	2
MAT 205	CALCULUS	3	3	3	0
QMT 205	INDUSTRIAL STATISTICS	3	3	3	0
RPT 151	POLYMER CHEMISTRY	2	2	2	0
RPT 154	PROC. OF SMR AND LATEX CONCENTRATE	3	3	3	0
RPT 164	SMR PROCESSING MACHINERY	2	2	2	0
ENL 236	INTERMEDIATE ENGLISH II	2	4	4	0
UIS 251/ TIS 250	ISLAMIC HISTORY & CIVILIZATION IV / ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>22</b>	<b>26</b>	<b>22</b>	<b>4</b>

Notes: Lect - Lecture, Lab./Lab. - Laboratory Work and/or Tutorial

## SEMESTER BREAK

YEAR 2

3 YEAR COURSE

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
RPT 165	NATURAL RUBBER PROCESSING AND PRACTICAL IN RRIM (11 WEEKS)	5	20	0	20

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
RPT 321	PHYSICAL TESTING OF RUBBER & PLASTICS	4	6	3	3
RPT 313	RUBBER AND PLASTICS MACHINERY	3	3	3	0
RPT 321	PLASTICS MATERIALS	4	5	3	2
RPT 332	RUBBER AND LATEX COMPOUNDING	6	7	5	2
	INCLUDE SEMESTER BREAK				
	TOTAL	22	41	14	27

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 6</b>					
MGT 126	INDUSTRIAL MANAGEMENT	3	3	3	0
RPT 251	ELEMENTARY POLYMER PHYSICS2	2	2	0	
RPT 351	POLYMER CHARACTERISATION	4	6	3	2
RPT 371	PLASTICS FABRICATION	4	5	3	2
RPT 382	RUBBER & LATEX TECHNOLOGY	5	6	4	2
RPT 390	PROJECT	2	4	0	4
RPT 391	IND. PRAC. TRAINING REPORT	2	2	0	2
UIS 303/ TIS 300	HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I / ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	TOTAL	26	32	19	13
	<b>GRAND TOTAL</b>	<b>133</b>	<b>179</b>	<b>113</b>	<b>66</b>

Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## DESCRIPTION OF SUBJECTS

### YEAR 1 (3 - YEAR COURSE)

- \* CHM 107 BASIC CHEMISTRY
- \* PHY 101 GENERAL PHYSICS
- \* MAT 107 BASIC MATHEMATICS
- \* MEN 120 TECHNICAL DRAWING
- \* ENL 120 FOUNDATION ENGLISH I
- \* UIS 101/ FOUNDATION OF ISLAM I /
- \* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)
- KKR \*\*\* CO-CURRICULUM
- \* ECO 108 INTRO. TO ECONOMICS
- \* CHM 157 BASIC CHEMISTRY II
- \* PHY 151 GENERAL PHYSICS II
- \* MAT 157 BASIC MATHEMATICS II
- \* CSC 133 COMPUTERS AND INFORMATION PROCESSING
- \* ENL 121 FOUNDATION ENGLISH II
- \* UIS 151/ FOUNDATION OF ISLAM II /
- \* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)
- KKR \*\*\* CO-CURRICULUM

### YEAR 2

#### RPT 104 PROCESSING OF CONVENTIONAL NATURAL RUBBER

This subject covers the studies of the chemical structures, properties, composition, methods of preservations, and coagulation of the natural rubber field latex.

The syllabus emphasises the processes and productions of conventional grades of natural rubber.

\* refer to page 12-16

\* CHM 200 BASIC ORGANIC CHEMISTRY

\* QMT 105 BASIC STATISTICS

\* MAT 207 ALGEBRA

\* ENL 230 INTERMEDIATE ENGLISH I

\* UIS 201/ CONTEMPORARY ISLAMIC THINKING III /

\* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

\* ETR 300 BASIC ENTREPRENEURSHIP

KKR \*\*\* CO-CURRICULUM

RPT 151 POLYMER CHEMISTRY

This is an introductory course in polymer chemistry. The syllabus covers the study of the more important industrially useful polymerisation reactions (i.e. the condensation and addition polymerisation) and the methods of polymerisation.

RPT 154 PROCESSING OF SMR AND LATEX CONCENTRATE

This subject covers the studies of the SMR scheme, its specifications, technical significance of its selected properties, the quality control in NR production, all the methods in the production of SMR grades and also the production of specialty rubbers. The syllabus also covers the methods of latex concentration and also latex specification and testing.

RPT 164 SMR PROCESSING MACHINERY

This subject is divided into two major sections namely the SMR Processing Machinery and Accounting.

In the first section of the syllabus, the SMR Processing Machinery covers the study of engineering components such as bolts and nuts, bearings, gears, v-belts, transmission chains and also the study of the processing machinery such as material transfer equipment, tanks and stirrers, size reduction equipment, driers and presses. The syllabus emphasises on the features, working principles, operation and maintenance of the above machines.

The second section of the syllabus covers the study of the concept of accounting, system of accounting, costing, break-even analysis and appraisal of capital investment.

\* CHM 203 BASIC PHYSICAL CHEMISTRY

\* MAT 257 CALCULUS

\* QMT 205 INDUSTRIAL STATISTICS

\* ENL 236 INTERMEDIATE ENGLISH II

\* UIS 251/ ISLAMIC HISTORY & CIVILIZATION IV /

\* TIS 200 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

KKR \*\*\* CO-CURRICULUM

\* refer to page 12-16

**RPT 165 NATURAL RUBBER PROCESSING AND TESTING**

This is a 14 week practical course conducted by RRIM at its Training School in Sungai Buluh. Students are required to undergo intensive training in natural rubber processing. This includes methods and techniques of processing, physical testing and two weeks industry attachment at natural rubber processing factories.

**RPT 312 PHYSICAL TESTING OF RUBBER AND PLASTIC**

The testing of plastics and rubber is carried out to determine their physical and mechanical properties. The experimental results obtained are often used by engineers and designers to assess their suitability for a particular application. Students are taught the various test methods standardised by international organisations such as British Standards Institution (BSI) and the American Society for Testing Materials (ASTM). Emphasis is also placed on the interpretation of experimental data and a word of caution about the comparison of test results.

**RPT 313 RUBBER AND PLASTICS MACHINERY**

This subject covers the study of the Rubber and Plastics Machinery commonly used in the rubber and plastics industries. The machines which are taught in this syllabus are two-roll mill, internal mixer, calender, moulding equipment, injection moulding machine, extruder and vulcanisation equipment. The syllabus emphasizes the feature, working principles, operation and maintenance of the above machines. Processing problems and remedial measures will also be discussed.

**RPT 321 PLASTIC MATERIALS**

The syllabus involves the study of various types of plastics materials which are commonly used nowadays.

The study includes the introduction of each polymer, The methods of polymerisation and processing. Physical and chemical properties of each polymer and the utilisation of its products for commercial use are also presented.

**RPT 332 RUBBER AND LATEX COMPOUNDING**

This subject is divided into two sections. Section A covers the study of Rubber Compounding Ingredients. The compounding ingredients which are discussed in this section include vulcanising agents, accelerators, fillers, modifiers, reclaimed rubber and antidegradants.

Section B covers the study of latex compounding ingredients. The ingredients referred here are vulcanising agents, accelerators, fillers, pigments. Surface-active agents, viscosity modifiers and protective colloids.

The methods of the preparation of solutions, dispersion and emulsions are also discussed in this section.

**RPT 251 ELEMENTARY POLYMER PHYSICS**

The aim of this subject is to give a better understanding on the fundamental structure of a polymer, particularly its mechanical and physical properties, such as physical testing, flow properties and creep properties.

**RPT 351 POLYMER CHARACTERISATION**

To introduce the various types of chemical analysis especially in the field of polymers. These include the basic theory, scope, principles and instrumentation of chromatography (i.e. paper, Thin Layer, HPLC and GC). Ultraviolet, visible, Infra-red, NMR, ESR, X-ray Spectroscopy and Thermal Analysis including TGA, DTA and DSC.

\* refer to page 12-16

## RPT 371 PLASTICS FABRICATION

This subject deals with all kinds of plastics processing. The processing technology of an injection moulding, film blowing, extrusion and thermoforming are to be discussed in greater depth. The approach adopted in the course is descriptive rather than analytical.

## RPT 382 RUBBER AND LATEX TECHNOLOGY

This subject is divided into two sections

Section A covers the study of Rubber Technology. The topics which are discussed in this section include the synthetic rubbers, technology of ebonite, hose technology, rubber-metal bonding and pneumatic tyres.

Section B covers the study of Latex Technology. The topics which are discussed in this section include latex moulding and casting, latex, dipping, latex foam and latex thread.

## RPT 390 PROJECT

The project work gives students the opportunity to apply their knowledge by making a full report on a given topic related to rubber or plastics technology. Their project work will be supervised by a lecturer or a group of lecturers. An oral presentation will be conducted for evaluating their project work and report.

## RPT 391 INDUSTRIAL TRAINING

Students are attached to rubber or plastics based industries for six weeks. The students are expected to experience the working environment of various departments such as production, quality assurance, maintenance and other departments.

## BIO 165 ECOLOGY

This subject is divided into two main sections. The first deals with the introductory concepts in Ecology which includes the Concept of Environment, Energy Relations, Cycle of Materials, Population and Ecosystems. The second part deals with issues relating to the impact of human activity to the environment. Topics included in this section are Water, Air and Soil Pollution; Exploitation of Natural Resources; Commercial Farming and Agricultural Activities; Urbanization and Environmental Conservation Efforts.

## \* MGT 126 INDUSTRIAL MANAGEMENT

## \* UIS 303/ HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I /

## \* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

\* refer to page 12-16

# DIPLOMA IN MICROBIOLOGY

## COURSE DESCRIPTION

The Diploma in Microbiology was established in 1972, with the aim of providing trained manpower at the semi-professional level in the field of microbiology, in line with the needs of relevant industries and government agencies.

Microbiology is the study of microscopic life forms such as bacteria, fungi and viruses and their relationship with man, animals and plants. This relationship includes not only the host-parasite relationship resulting in diseases, but also the myriad roles and applications of microorganisms in improving the quality of human life. Production of useful materials e.g. biogas and single cell proteins, biocontrol of insect pests, production of antibiotics and vaccines are but a few examples of applications that can benefit mankind.

Basic sciences are taught in the first 2 years so as to provide a firm foundation. The fundamentals of microbiology are also introduced in the second year. More advanced subjects covering various applications are taught in the third and fourth year, such as: food microbiology, industrial microbiology, medical microbiology, environmental microbiology and plant pathology. Students are also taught skill related courses such as introduction to computer science, basic entrepreneurship and introduction to economics, to equip them for business ventures.

Students are also required to undergo 6 months of practical training at a government department or private industry during the final year.

## CAREER PROSPECTS

Graduates from the course may find employment as officers or research assistants in government, hospital and private medical or testing laboratories. With the increasing trend in private industries to achieve ISO standards, many opportunities are created for quality control officers, especially in food and medical production. Graduates are also employed by government and private research centres such as MARDI, RRIM, PORIM, SIRIM and AAR as research assistants or officers.

## OPPORTUNITY FOR FURTHER STUDIES

Graduates can further their studies to a degree level at local universities such as USM, UPM, UKM, UNIMAS and UM in the field of biology, agricultural science, microbiology, food technology and other related fields. Appropriate credit transfer may be given in deserving cases. Graduates with good results can also apply to do dentistry, medicine or optometry in UM, UKM or the International Medical College.

Many graduates have been able to further their studies in overseas universities in the fields of Applied Microbiology, Biotechnology and Food Technology. Transfer of credits is often given, allowing a student to obtain an honours degree in two years.

## FACILITIES AVAILABLE

The course is supported by a general preparatory laboratory, three microbiology laboratories, a biochemistry laboratory and a virology laboratory.



**ACADEMIC STAFF**

No.	Name	Qualification	Area of Specialization
<b>Principle Lecturer</b>			
1.	Sulong Ahmad Kamaruddin	M.Sc. (U. Minnesota) D.V.M. (Bangladesh Agriculture U.)	Microbiology
2.	Wan Mohamad b. Wan Kadir	Ph.D. (U.Tennessee) M.Sc. (State Ghent U.) B. Agric. Sc. (U.M)	Agriculture (Soil Fertility and Management)
<b>Senior Lecturers</b>			
1.	Abd. Razak Baba	M.Sc. Agric. (Institut Pertanian Bogor)	Agronomy
2.	Choo Teck Keong	M.Sc. (U. Birmingham) B.Sc. Agr. (U.Guelph)	Microbiology
3.	Debra Siru	B.Sc. Hons. (U. College Swansea, U. Wales)	Microbiology
4.	Kamsani Ngalib	M.Sc. (U.M.) B.Sc. Hons. (North East London Poly.)	Biochemistry
5.	Lee Hung Kiong	M. Tech. (Massey U.) Dip. Tech. (Massey U.) B.Sc. Hons. (U.M.)	Fermentation Technology
6.	Nasuddin Othman	Ph.D. (Stirling U.) M.Sc. (Agric. State Ghent U.) B.Sc. (Institut Pertanian Bogor)	Farm Management
7.	Teow Sun Soo	Ph.D. (U.K.M.) M.Sc. (Punjabi U.)	Genetic Engineering and Medical Microbiology
<b>Lecturers</b>			
1.	Hazilia Hussain	M.Sc. (Ohio U.) B.Sc. (Marquette U.)	Biochemistry
2.	Mohd Faiz Foong Abdullah	B.Sc. Hons. (U.M.)	Microbiology
3.	Mohd. Yusof Hashim	M.B.A (U.K.M.) D.V.M. (Bangladesh Agriculture U.)	Finance
4.	Nik Roslan Nik Abd. Rashid	B.Sc. Hons. (U.S.M.) Dip. Microbiology (I.T.M.)	Microbiology

No.	Name	Qualification	'Area of Specialization
5.	Noraida Shariff	B.Sc. Hons. (U. Western Australia)	Biochemistry
6.	Othman Ahmad	M.Sc. (U. Missouri) B.Sc. (Kansas State U. at Kansas City)	Microbiology
7.	Roslinah Mohamad Hussain	M.Sc. (California State U.) B.A (W.Virginia U.)	Medical Microbiology
8.	Wan Kamil Wan Mohammad	B.Sc. Hons. (U.Salford) Dip. Science (I.T.M.)	Biochemistry
9.	Zainon Abd. Rahman	M.Sc. (U. College North Wales) B.Sc. Hons. (U.M.)	Cellular and Molecular Plant Sciences

## CURRICULUM 4 - YEAR COURSE

### YEAR 1

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
BIO 105	BIOLOGY	4	5	3	2
CHM 107	BASIC CHEMISTRY I	4	5	3	2
PHY 101	GENERAL PHYSICS I	4	5	3	2
MAT 107	BASIC MATHEMATICS I	4	4	4	0
ENL 120	FOUNDATION ENGLISH I	2	4	4	0
UIS 101/ TIS 100	FOUNDATION OF ISLAM I/ISLAMIC CIVILISATION I (HISTORY)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	TOTAL	21	27	19	8

Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
BIO 155	BIOLOGY	4	5	3	2
CHM 157	BASIC CHEMISTRY II	4	5	3	2
PHY 151	GENERAL PHYSICS II	4	5	3	2
MAT 157	BASIC MATHEMATICS II	4	4	4	0
ENL 121	FOUNDATION ENGLISH II	2	4	4	0
UIS 151/ TIS 150	FOUNDATION OF ISLAM I/ISLAMIC CIVILISATION (HISTORY)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>27</b>	<b>19</b>	<b>8</b>

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
BIO 106	ECOLOGY	2	2	2	0
MIC 108	GENERAL MICROBIOLOGY I (THEORY)	2	2	2	0
MIC 118	GENERAL MICROBIOLOGY I (PRACTICAL)	2	3	0	3
QMT 105	BASIC STATISTICS	3	3	3	0
CHM 200	BASIC ORGANIC CHEMISTRY	4	6	3	3
CHM 203	PHYSICAL CHEMISTRY	4	6	3	3
ENL 230	INTERMEDIATE ENGLISH I	2	4	4	0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING/ ISLAMIC CIVILIZATION III (ETHICS)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>22</b>	<b>30</b>	<b>19</b>	<b>11</b>

**Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial**

## YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
BIO 206	GENETICS	3	4	2	2
MIC 158	GENERAL MICROBIOLOGY II (THEORY)	2	2	2	0
MIC 168	GENERAL MICROBIOLOGY II (PRACTICAL)	2	3	0	3
CHM 256	BASIC ANALYTICAL CHEMISTRY	3	5	2	3
CHM 259	BASIC BIOCHEMISTRY	4	6	3	3
QMT 205	INDUSTRIAL STATISTICS	3	3	3	0
ENL 231	INTERMEDIATE ENGLISH II	2	4	4	0
UIS 251/ TIS 250	ISLAMIC HISTORY AND CIVILIZATION/ ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>22</b>	<b>31</b>	<b>18</b>	<b>13</b>

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect	Lab./Tut.
<b>Part 5</b>					
MIC 250	SYSTEMATIC BACTERIOLOGY	3	4	2	2
MIC 305	VIROLOGY	3	4	2	2
MIC 206	MYCOLOGY	3	4	2	2
FST 236	FOOD ANALYSIS	2	4	1	3
CHM 309	ADDITIONAL BIOCHEMISTRY	4	6	3	3
CHM 305	INSTRUMENTAL ANALYSIS	4	6	3	3
UIS 303/ TIS 300	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/ ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	<b>TOTAL</b>	<b>21</b>	<b>30</b>	<b>15</b>	<b>15</b>

**Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial**

**YEAR 3**

YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect	Lab.Tut.
<b>Part 6</b>					
MIC 310	MICROBIAL PHYSIOLOGY	3	4	2	2
MIC 304	INDUSTRIAL MICROBIOLOGY	4	6	2	4
MIC 341	MEDICAL MICROBIOLOGY	3	4	2	2
MIC 231	PLANT PATHOLOGY	3	4	2	2
MIC 204	FOOD MICROBIOLOGY	3	4	2	2
CSC 133	COMPUTERS & INFORMATION PROCESSING	3	4	2	2
ECO 108	INTRODUCTION TO ECONOMICS	3	3	3	0
UIS 353/ TIS 350	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/ ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	<b>TOTAL</b>	<b>24</b>	<b>31</b>	<b>17</b>	<b>14</b>

**YEAR 4**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab.Tut.
<b>Part 7</b>					
MIC 371	PRACTICAL TRAINING	12	6 Months		
	<b>TOTAL</b>	<b>12</b>			

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect	Lab.Tut.
<b>Part 8</b>					
MIC 351	DEVELOPMENTS IN APPLIED MICROBIOLOGY	2	4	0	4
MIC 207	ENVIRONMENTAL MICROBIOLOGY	3	4	2	2
MIC 312	SOIL MICROBIOLOGY	3	4	2	2
ETR 300	BASIC ENTREPRENEURSHIP	3	3	3	0
MGT 126	INDUSTRIAL MANAGEMENT	3	3	3	0
FST 173	FOOD SANITATION AND LEGISLATION	3	3	3	0
	<b>TOTAL</b>	<b>17</b>	<b>21</b>	<b>13</b>	<b>8</b>
	<b>GRAND TOTAL</b>	<b>160</b>	<b>197</b>	<b>120</b>	<b>78</b>

Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial

## DESCRIPTION OF SUBJECTS

### YEAR 1 (4 - YEAR COURSE)

- \* BIO 105 BIOLOGY
- \* CHM 107 BASIC CHEMISTRY I
- \* PHY 101 GENERAL PHYSICS I
- \* MAT 107 BASIC MATHEMATICS I
- \* ENL 120 FOUNDATION ENGLISH I
- \* UIS 101/ FOUNDATION OF ISLAM/  
\* TIS 100 ISLAM CIVILISATION I (HISTORY)
- \* BIO 155 BIOLOGI
- \* CHM 157 BASIC CHEMISTRY II
- \* PHY 151 GENERAL PHYSICS II
- \* MAT 157 BASIC MATHEMATICS II
- \* ENL 121 FOUNDATION ENGLISH II
- \* UIS 151/ FOUNDATION OF ISLAM II/  
\* TIS 150 CIVILISATION (HISTORY)

### YEAR 2

#### BIO 106 ECOLOGY

This subject aims at introducing ecology from a microbiological viewpoint with relevant examples on microbial ecology.

#### MIC 108 GENERAL MICROBIOLOGY I (THEORY)

This is an introductory subject on the general biology of microorganisms and fundamental microbiological techniques. Topics covered include history of microbiology, microscopy, cultivation of bacteria, pure culture techniques, measurement of bacterial populations, general metabolism, genetics, growth media and control of microorganisms.

#### MIC 118 GENERAL MICROBIOLOGY I (PRACTICAL)

This is the practical component of MIC 108 and is taught and run in parallel with it.

#### BIO 206 GENETICS

This is an introductory course dealing with the structure and function of cells, and basic genetics. The syllabus includes topics on cell division and genetics according to Mendel's laws such as interaction of gene, linkage, recombination and sex linkage; and microbial genetics.

\* refer to page 12-16

## MIC 158 GENERAL MICROBIOLOGY II (THEORY)

This subject is a continuation of MIC 108. The syllabus covers topics such as host-parasite relationship and introduction to moulds, yeasts and viruses. The second part of the syllabus touches on applied microbiology such as soil, air and food microbiology and discusses the economic importance of microorganisms to mankind.

## MIC 168 GENERAL MICROBIOLOGY II (PRACTICAL)

This is the practical component of MIC 158 and is taught and run in parallel with it.

## CHM 259 BASIC BIOCHEMISTRY

This is an introductory course in Biochemistry. The syllabus covers the basic study of macromolecules (biopolymers) found in nature. Aspects of the study are molecular structures and properties in relation to their functions. It also introduces the concept of intermediary metabolism of the macromolecules. Included is basic enzymology.

\* QMT 105 BASIC STATISTICS

\* CHM 200 BASIC ORGANIC CHEMISTRY

\* CHM 203 PHYSICAL CHEMISTRY

\* ENL 230 INTERMEDIATE ENGLISH I

\* UIS 201/ CONTEMPORARY ISLAMIC THINKING/

\* TIS 250 ISLAMIC CIVILIZATION III (ETHICS)

\* CHM 256 BASIC ANALYTICAL CHEMISTRY

\* QMT 205 INDUSTRIAL STATISTICS

\* ENL 231 INTERMEDIATE ENGLISH II

\* UIS 251/ ISLAMIC HISTORY AND CIVILIZATION/

\* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

## YEAR 3

## MIC 250 SYSTEMATIC BACTERIOLOGY

This subject involves the study of classical and modern bacterial taxonomy. Important genera of bacteria are investigated and cultured, biochemical and serological methods are used to identify various groups of bacteria.

## MIC 305 VIROLOGY

This is a basic subject on the study of the morphology and replication of viruses. Topics include techniques for detection and assay of viruses. The significance of viruses in cancer and interferon production is discussed.

\* refer to page 12-16

## MIC 206 MYCOLOGY

This is a study on fungi. Topics include characteristics, classification and reproduction of fungi. The importance of fungi to mankind is elaborated.

## MIC 204 FOOD MICROBIOLOGY

This is a study of the types of microorganisms involved in food spoilage and food poisoning. Methods of protecting and preventing food from becoming contaminated and spoiled eg. heat treatment, dehydration, freezing etc. are discussed.

## FST 236 FOOD ANALYSIS

The subject emphasizes the practical aspects of food analysis. The importance and the principles involved in the determination of the basic constituents of food are discussed.

## CHM 309 ADDITIONAL BIOCHEMISTRY

This is an advanced course and an extension to Biochemistry I. The topics studied include advanced metabolism of protein and amino acid, carbohydrate, lipid and nucleic acid. The energy concept in metabolism is also considered.

## MIC 310 MICROBIAL PHYSIOLOGY

The course deals with the basic concepts of microbial growth kinetics, principles of batch and continuous cultures and regulation of metabolism. The physiology of yeast and fungi is also discussed.

## MIC 304 INDUSTRIAL MICROBIOLOGY

This subject covers various topics in applied microbiology pertaining to the role of microorganisms in industry. The use of microbial cells, enzymes, and metabolic products are studied. The student is taught how to use fermentation equipment like shakers and laboratory fermentors.

## MIC 341 MEDICAL MICROBIOLOGY

The subject deals with the basic aspects of bacterial pathogenicity, host defence systems, epidemiology and the use of antimicrobial agents. Diseases caused by microorganisms are discussed.

## MIC 231 PLANT PATHOLOGY

This is an introductory course on plant diseases and their methods of control. Wherever possible, current information on plant diseases in this country will be used.

### \* CHM 305 BASIC INSTRUMENTAL ANALYSIS

- \* UIS 303/ HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I/
- \* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

- \* CSC 133 COMPUTERS & INFORMATION PROCESSING
- \* ECO 108 INTRODUCTION TO ECONOMICS

- \* UIS 353/ HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/
- \* TIS 350 ISLAMIC CIVILIZATION VI (HUMANITIES)

\* refer to page 12-16



## YEAR 4

### MIC 371 PRACTICAL TRAINING

Students are required to undergo a closely supervised practical training for a duration of six months at a private firm, government agency or research institution that can offer relevant training in the field of microbiology. This will provide opportunities for students to gather valuable hands-on experience. Students are required to submit a written report and present a seminar on their training.

### MIC 351 DEVELOPMENTS IN APPLIED MICROBIOLOGY

This subject is designed to introduce students to recent advances in the field of applied microbiology. There is no fixed syllabus. The topics taught are determined by the lecturers involved from time to time, reflecting current issues in applied microbiology. Principles of genetic engineering, enzyme technology, plant and animal tissue culture, bioremediation of pollution are some of the topics.

### MIC 207 ENVIRONMENTAL MICROBIOLOGY

This is a study of microorganisms in man's immediate environment: the air, water and sewage. Emphasis is placed on the various biological processes mediated by microorganisms in treating waste generated by human activities, vis-a-vis to maintaining a healthy environment for conducive living.

### MIC 312 SOIL MICROBIOLOGY

The syllabus introduces principles of soil science including soil chemistry and physics. Microbial involvement in the major nutrient cycle, nitrogen fixation and maintenance of soil fertility is discussed.

### FST 173 FOOD SANITATION AND LEGISLATION

Study of food hygiene, types of food poisoning brought by bacteria, parasites, viruses and chemicals. Mode of spread of diseases - public health aspects. Hygiene and sanitation in food manufacture and processing. Study of food additives. Detailed study of different codes of practice for food hygiene.

Study of Malaysian Food Laws and comparison with U.K. & U.S.A. laws. Working of Codex Alimentarius and recommended food standards.

### \* ETR 300 BASIC ENTREPRENEURSHIP

### \* MGT 126 INDUSTRIAL MANAGEMENT

\* refer to page 12-16

# DIPLOMA IN INDUSTRIAL CHEMISTRY

## COURSE DESCRIPTION

The Diploma in Industrial Chemistry course was established as the Diploma in Experimental Laboratory Technology course in 1968. It was started as a 3-year course which was later lengthened to the present 4-year course in 1971 after revision of the curriculum. Students learn the basic sciences during the first four semesters. During the last four semesters, students will be introduced to subjects in chemical engineering and analytical chemistry. Other subjects include industrial management, computer science, economics and entrepreneurship. Students are required to undergo industrial training, usually at a chemical-based industry. They are also required to complete a research project and to submit a report based on their research work during the final year. Academic visits to industries relating to the course are arranged.

## CAREER PROSPECTS

Graduates can be employed as assistant chemists, assistant chemical engineers, assistant production managers, assistant plant managers, production supervisors or assistant research officers in private firms or government agencies.

## OPPORTUNITY FOR FURTHER STUDIES

Graduates of this course can further their studies in universities locally or abroad in chemical engineering, analytical chemistry or applied chemistry.

## FACILITIES AVAILABLE

There are two main laboratories which are the Instrumental Analysis Laboratory and the Unit Operation Laboratory. The Instrumental Analysis Laboratory is equipped with chromatographic equipment such as Gas Chromatography, High Performance Liquid Chromatography and Gas Chromatography-Mass Selective Detector; spectrophotometers such as Nuclear Magnetic Resonance, Atomic Absorption, Infrared, Ultraviolet-visible and Inductively Coupled Plasma. Others are Capillary Electrophoresis and Spectrofluorometer. The Unit Operation Laboratory is well-equipped with Process Control Simulators run by a Distributed Control System. Other equipment include Spray Dryer, Tray Dryer, Cooling Tower, Packed Column, Distillation Column and Soxhlet Extractor.

**ACADEMIC STAFF**

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturers</b>			
1.	Abdul Halim b. Mohd. Hashim	M. Sc. (Ohio U.) B. Sc. (U.M.)	Physical chemistry
2.	Goh Teik Poh	Ph. D. (U.M.) M. Sc. (U.M.) B. Sc. Hons. (U. Adelaide)	Organic chemistry
3.	Ku Halim b. Ku Hamid	M. Sc. Engr. (U.K.M.) B. Sc. Hons. (U.K.M.)	Mechanical engineering /chemical technology
4.	Mohd. Rosli b. Sulaiman	M. Sc. (U. Newcastle- B. Sc. Upon-Tyne)	Chemical engineering
5.	Norsaadah bt. Haji Ismail	Ph. D. (N. Illinois U.) B. Sc. (U. Loughborough)	Physical organic chemistry
6.	Stephen Lee Koon Liang	M. Engr. (U. Florida) B. Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Chemical engineering / chemistry
7.	Wan Shabuddin b. Hj. Wan Ali	M. Sc. (Marshall U.) B. Sc. Engr. (U. Tennessee)	Chemical engineering / physical organic chemistry
<b>Lecturers</b>			
1.	Abdul Aziz b. Ishak	M. Sc. Engr. (U. Washington) B. Sc. Engr. (Wayne State U.)	Chemical engineering
2.	Famiza bt. Abdul Latif	B. Sc. Hons. (U.K.M.)	Chemistry
3.	Haliza bt. Kassim	M. Sc. (W. Illinois U.) B. Sc. (W. Illinois U.)	Analytical chemistry
4.	Norazah bt. Abdul Rahman	B. Engr. Hons. (U. Missouri-Rolla)	Chemical engineering
5.	Nurhuda bt. Hj. Ismail	B. Engr. Hons. (U.T.M.)	Chemical engineering
6.	Ruzitah bt. Mohd. Salleh	M. Sc. Engr. (U. Washington) B. Engr. Hons. (U. Strathclyde)	Chemical engineering
7.	Haji Safaruddin b. Haji Kamarudin	B. Sc. Hons. (U. Teesside) Postgrad Dip. Env. Tech. & Mgmt. (Asian Inst. of Tech.)	Environmental engineering

No.	Name	Qualification	Area of Specialization
8.	Sharifah Aishah bt. S. A. Kadir	B. Sc. Hons. (U. Salford)	Chemical engineering
9.	Zainuddin b. Hashim	M. Sc. (U. Kent) B. Sc. (U.S.M.)	Chemistry
10.	Zarila bt. Mohd. Shariff	M. Sc. (Cal. St. U.) B. Sc. (Cal. St. U.)	Chemistry

**CURRICULUM  
4 - YEAR COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
BIO 105	BIOLOGY I	4	5	3	2
CHM 107	BASIC CHEMISTRY I	4	5	3	2
MAT 107	BASIC MATHEMATICS I	4	4	4	0
PHY 101	GENERAL PHYSICS I	4	5	3	2
ENL 120	FONDATION ENGLISH I.	2	4	4	0
UIS 101/	FOUNDATION OF ISLAM II/	2	2	2	0
TIS 100	ISLAMIS CIVILIZATION II (HISTORY)				
KKR ***	CO-CURRICULUM I	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>27</b>	<b>19</b>	<b>8</b>

**Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
BIO 155	BIOLOGY II	4	5	3	2
CHM 157	BASIC CHEMISTRY II	4	5	3	2
MAT 157	BASIC MATHEMATICS II	4	4	4	0
PHY 151	GENERAL PHYSICS II	4	5	3	2
ENL 121	FOUNDATION ENGLISH II	2	4	4	0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II/ ISLAMIC CIVILIZATION II (THOUGHTS)	2	2	2	0
KKR ***	CO-CURRICULUM II	1	2	0	2
	<b>TOTAL:</b>	<b>21</b>	<b>27</b>	<b>19</b>	<b>8</b>

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
CHM 203	PHYSICAL CHEMISTRY	4	5	3	2
CHM 256	BASIC CHEMICAL ANALYSIS	3	5	3	3
CSC 133	INTRODUCTION TO COMPUTER SCIENCE	3	4	2	2
MAT 207	ALGEBRA	3	3	3	0
MEN 120	TECHNICAL DRAWING	2	4	0	4
ENL 230	INTERMEDIATE ENGLISH I	2	4	4	0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING/ ISLAMIC CIVILIZATION III (ETHICS)	2	2	2	0
KKR ***	CO-CURRICULUM III	1	2	0	2
	<b>TOTAL:</b>	<b>20</b>	<b>29</b>	<b>16</b>	<b>13</b>

Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.

## YEAR 2

YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
CHM 200	BASIC ORGANIC CHEMISTRY	4	5	3	2
CHM 306	ADDITIONAL ANALYTICAL CHEMISTRY	3	5	2	3
CMT 171	THERMODYNAMICS I	3	3	3	0
MAT 257	CALCULUS	3	3	3	0
QMT 105	GENERAL STATISTICS	3	3	3	0
ENL 231	INTERMEDIATE ENGLISH II	2	4	4	0
UIS 251/ TIS 250	ISLAMIC HISTORY AND CIVILIZATION/ ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2	2	2	0
KKR ***	CO-CURRICULUM IV		2	0	2
	<b>TOTAL:</b>	<b>21</b>	<b>27</b>	<b>20</b>	<b>7</b>

Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.

## YEAR 3

### DESCRIPTION OF SUBJECTS

YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
CHM 250	ADDITIONAL ORGANIC CHEMISTRY	3	5	2	3
CHM 305	BASIC INSTRUMENTAL ANALYSIS	4	5	3	3
CMT 102	UNIT OPERATION I	3	3	3	0
CMT 104	INDUSTRIAL PROCESS I	3	3	3	0
CMT 271	THERMODYNAMICS II	3	3	3	0
QMT 205	INDUSTRIAL STATISTICS	3	3	3	0
UIS 303/ TIS 300	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I/ ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	<b>TOTAL:</b>	<b>21</b>	<b>24</b>	<b>19</b>	<b>6</b>

\* MAT 157

BASIC MATHEMATICS II

\* PHY 151

GENERAL PHYSICS I

\* ENL 121

FOUNDATION

\* UIS 151

FOUNDATION OF ISLAM

\* TIS 150

ISLAMIC CIVILIZATION II (THOUGHT)

Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.

\* refer to page 12-10

**YEAR 3**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 6</b>					
CHM 300	SPECIAL ORGANIC CHEMISTRY	3	5	2	3
CHM 355	ADDITIONAL INSTRUMENTAL ANALYSIS (THEORY)	2	2	2	0
CMT 202	UNIT OPERATIONS II	4	5	3	2
CMT 204	INDUSTRIAL PROCESS II	4	6	3	3
CMT 211	FLUID MECHANICS	4	6	3	3
ECO 108	INTRODUCTION TO ECONOMICS	3	3	3	0
UIS 353/ TIS 350	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/ ISLAMIC CIVILIZATION VI (HUMANITIES)	2	2	2	0
TOTAL:		22	29	18	11

**YEAR 4**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 7</b>					
CHM 251	INORGANIC CHEMISTRY	3	5	2	3
CHM 375	ADDITIONAL INSTRUMENTAL ANALYSIS (PRACTICAL)	3	6	0	6
CMT 114	HEAT TRANSFER	3	3	3	0
CMT 302	UNIT OPERATION III	4	6	3	3
CMT 304	INDUSTRIAL PROCESS III	2	2	2	0
CMT 334	INDUSTRIAL TRAINING*	4			
CMT 362	UNIT OPERATIONS (PRACTICAL)	1	3	0	3
TOTAL:		20	25	10	15

Note: \* 2 months industrial training during the break in semester 6.

\* Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.

**YEAR 4**

YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 8</b>					
CHM 253	ADDITIONAL PHYSICAL CHEMISTRY	3	5	2	3
CMT 113	PROCESS INSTRUMENTATION	2	2	2	0
CMT 124	MATERIAL SCIENCE	2	2	2	0
CMT 314	PROJECT AND SEMINAR	4	7	1	6
ETR 300	ENTREPRENEURSHIP	3	3	3	0
MGT 126	INDUSTRIAL MANAGEMENT	3	3	3	0
MIC 152	INDUSTRIAL MICROBIOLOGY	3	4	2	2
	TOTAL:	20	26	15	11
	<b>GRAND TOTAL:</b>	<b>166</b>	<b>214</b>	<b>136</b>	<b>79</b>

Notes: Lect - Lecture, Lab./Tut. = Laboratory and/or Tutorial.

**DESCRIPTION OF SUBJECTS**

**YEAR 1 (4 - Year Course)**

- \* BIO 105 BIOLOGY I
- \* CHM 107 BASIC CHEMISTRY I
- \* MAT 107 BASIC MATHEMATICS I
- \* PHY 101 GENERAL PHYSICS I
- \* ENL 120 FOUNDATION ENGLISH I
- \* UIS 101 FOUNDATION OF ISLAM I
- \* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)
- KKR \*\*\* CO-CURRICULUM I
- \* BIO 155 BIOLOGY II
- \* CHM 157 BASIC CHEMISTRY II
- \* MAT 157 BASIC MATHEMATICS II
- \* PHY 151 GENERAL PHYSICS II
- \* ENL 121 FOUNDATION ENGLISH II
- \* UIS 151 FOUNDATION OF ISLAM II
- \* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)
- KKR \*\*\* CO-CURRICULUM II

\* refer to page 12-16



## YEAR 2

### CHM 203 PHYSICAL CHEMISTRY

Topics on chemical and ionic equilibrium, salt hydrolysis and buffer systems, chemical kinetics, thermochemistry, phase equilibrium and colloid chemistry are covered in this subject.

### CHM 256 BASIC ANALYTICAL CHEMISTRY

This covers the theory and practice of quantitative analytical chemistry. It includes evaluation of chemical data, sample treatment prior to analysis, calibration of volumetric glassware, volumetric and gravimetric analysis and chromatography.

\* CSC 133 INTRODUCTION TO COMPUTER SCIENCE

\* MAT 207 ALGEBRA

\* MEN 120 TECHNICAL DRAWING

\* ENL 230 INTERMEDIATE ENGLISH I

\* UIS 201 CONTEMPORARY ISLAMIC THINKING

\* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

KKR \*\*\* CO-CURRICULUM III

### CHM 200 BASIC ORGANIC CHEMISTRY

This subject covers the naming, structures, bonding, reactions and the uses of saturated and unsaturated hydrocarbons, alkyl halides, hydroxyl and carbonyl compounds and amines.

### CHM 306 ADDITIONAL ANALYTICAL CHEMISTRY

This covers the theoretical and practical aspects of redox titration, potentiometric titration, complexion titration, and conductometric titration. Also covered are chromatographic separation and its applications.

### CMT 171 THERMODYNAMICS I

This is an introductory course in thermodynamics. Concepts of temperature, pressure, heat and work are dealt with. The first law of thermodynamics is introduced. Closed and open systems are discussed.

\* MAT 257 CALCULUS

\* QMT 105 GENERAL STATISTICS

\* ENL 231 INTERMEDIATE ENGLISH II

\* UIS 251 ISLAMIC HISTORY AND CIVILIZATION

\* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

KKR \*\*\* CO-CURRICULUM IV

\* refer to page 12-16

## YEAR 3

### CHM 250 ADDITIONAL ORGANIC CHEMISTRY

Topics on physical organic chemistry taught in this subject are:  $sp^3$  and  $sp^2$  hybridization, structures of benzene, delocalisation of electrons, mesomeric and inductive effects, concepts of chemical resonance, structures and reactivities of organic compounds, strength of organic acids and bases, mechanisms of electrophilic and nucleophilic substitution reactions, production and industrial uses of some basic organic chemicals.

### CHM 305 BASIC INSTRUMENTAL ANALYSIS

This is an introduction to the theory, application and basic components of Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Atomic Absorption Spectrophotometry (AAS), Flame Photometry, Ultraviolet and Visible (UV-vis) Spectrophotometry, Infrared (IR) Spectrophotometry and Polarimetry.

### CMT 102 UNIT OPERATIONS I

This is an introduction to chemical engineering. The subject covers fundamental aspects of physical separation processes, such as distillation, evaporation and drying.

### CMT 104 INDUSTRIAL PROCESS I

Topics included are units, introduction to material and energy balances, fundamentals of processes, types of processes and descriptions on certain selected processes.

### CMT 271 THERMODYNAMICS II

This subject includes further understanding on thermodynamics. The second law of thermodynamics, equipment for heat transfer and work, mixtures and solution are discussed.

\* QMT 205 INDUSTRIAL STATISTICS

\* UIS 303 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I

\* TIS 300 ISLAMIC CIVILIZATION v (ISLAMIC POLITICAL SYSTEM)

### CHM 300 SPECIAL ORGANIC CHEMISTRY

Topics covered in this subject are reactions and industrial uses of benzene, diazonium ion, free radical, ionic and condensation polymerization, thermoplastic and thermosetting plastics, synthetic fibres stereochemistry, chemistry of carbohydrates, amino acids, polypeptides and heterocyclic compounds such as pyrole, furan, thiofene, and pyridine. The chemistry of terpenoids and steroids is also covered.

### CHM 355 ADDITIONAL INSTRUMENTAL ANALYSIS (THEORY)

This subject provides the theory, applications and basic components of the following instruments: Fluorimetry, Nephelometry and Turbidimetry, Nuclear Magnetic Resonance (NMR). Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC) are discussed further.

### CMT 202 UNIT OPERATIONS II

This course involves the study of mass and heat transfer and the performance of equipment for solvent extraction, gas absorption, humidification and drying.

\* refer to page 12-16

## CMT 204 INDUSTRIAL PROCESS II

This subject focuses on environmental pollution and the ways to solve these problems. It also covers the studies on the chemical processes and the economic aspects in the manufacture of cement, the production of paints and the refining of petroleum into marketable products.

## CMT 211 FLUID MECHANICS

The course is designed to provide the students with the principles of flow of fluids through pipes, bends, valves, etc. The principles on the pumping of fluids are also included.

### \* ECO 108 INTRODUCTION TO ECONOMICS

### \* UIS 353 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II

### \* TIS 350 ISLAMIC CIVILIZATION VI (HUMANITIES)

## YEAR 4

## CHM 251 INORGANIC CHEMISTRY

The topics covered include transition elements chemistry, co-ordination compounds, complexes, isomerism in complexes, valence bonds theory and crystal field theory.

## CHM 375 ADDITIONAL INSTRUMENTAL ANALYSIS (PRACTICAL )

Analysis of different samples using instruments such as Visible and Ultraviolet Spectrophotometer, Flame Photometer, Atomic Absorption Spectrophotometer with and without Graphite Furnace, Gas and Liquid Chromatographic instruments.

## CMT 114 HEAT TRANSFER

This subject introduces topics on the different kinds of heat transfer i.e. conduction, convection and radiation in different cases, types of heat exchangers. An introduction on boiling and condensation is also included.

## CMT 302 UNIT OPERATIONS III

The unit operations include filtration, centrifugation, sedimentation, size reduction, transportation and storage of materials. Also included is the study of process instrumentation.

## CMT 304 INDUSTRIAL PROCESS III

This is the study on chemical processes and the economic considerations involved in the manufacture of sulphuric acid and alkalis. It also deals with the production of industrial gases and their important uses.

## CMT 334 INDUSTRIAL TRAINING

Students are required to do industrial training at chemical or petroleum-based industries for a period of 2 months.

## CMT 362 UNIT OPERATIONS (PRACTICAL)

At least 10 different types of equipment are made available to the students to do their experiments. Each student is required to complete any 7 of the experiments and reports are to be submitted. Examples of the equipment available are Fluidised Bed Apparatus, Mixing Apparatus, Heat Transfer Equipment, Control Trainer Unit, Air Conditioning Training Unit and Fluid Mechanics Apparatus.

\* refer to page 12-16

## CHM 253 ADDITIONAL PHYSICAL CHEMISTRY

Topics on chemical kinetics, electro-chemistry and nuclear chemistry are introduced.

## CMT 113 INSTRUMENTATION PROCESS

This introductory course includes historical control systems, modern control, block diagrams, transfer functions, responses of control systems, measurements of process variables, introduction to pneumatic and electronic instruments, hydraulic control system and transducers.

## CMT 124 MATERIAL SCIENCE

This introductory course includes structure of solids, solid solutions, phase rule, ferrous alloys, non ferrous alloys and corrosion engineering.

## CMT 314 PROJECT AND SEMINAR

Students are required to do a project/research which is related to industrial chemistry. A report on the project/research has to be submitted. The students are also required to present their findings in a class seminar.

\* ETR 300 ENTREPRENEURSHIP

\* MGT 126 INDUSTRIAL MANAGEMENT

\* MIC 152 INDUSTRIAL MICROBIOLOGY

\* refer to page 12-16

# DIPLOMA IN FOOD TECHNOLOGY

## COURSE DESCRIPTION

Food technology is the application of science and technology to all processes within the food industry involved in transforming raw materials from the farm into edible forms for consumers. The food technologist uses scientific principles and technology for the production, processing, packaging, distribution, preparation and evaluation of safe and wholesome food products.

The Diploma in Food Technology course was introduced at the School of Applied Sciences, Institut Teknologi MARA in July 1972. The course aims to produce graduates who are versatile and are able to find employment in the various industries and government agencies directly or indirectly related to food technology.

The subjects offered are carefully selected to meet the demands of the private and public sectors, especially with regards to the processing and/or production of foods, monitoring and ensuring their quality requirements, carrying out research and development, marketing of food products, and enforcement of food regulations. Graduates of this course will also be equipped with business-related subjects, in line with the government's vision to encourage more entrepreneurs.

The course is a full-time four-year or eight semester programme. Students will be doing basic sciences during the first year, and specialisation of the course begins in the second year. In addition to theoretical and laboratory work at the institute, students will also undergo practical training at various food-based industries or government agencies for a duration of one semester.

## CAREER PROSPECTS

Graduates have the option of seeking immediate employment in the private or public sector, as quality control supervisors, production supervisors, assistant research officers or assistant food technologists. Other career opportunities include marketing executives, management trainees, R & D executives, liaison officers, technical sales executives, nutritionists as well as other positions in food-based industries.

## OPPORTUNITIES FOR FURTHER STUDIES

Graduates can further their studies in the same or related fields, both locally and in foreign universities. Generally, graduates may be given one to two years exemption towards their B. Sc. degree depending on the discipline, the university selected, and the graduate's performance at the Diploma level.

## FACILITIES AVAILABLE

Well equipped laboratories are available for food processing, food analysis/quality control, sensory evaluation, and instrumental analysis. Students will be able to work on sophisticated equipment such as spray dryer, freeze dryer, laboratory pasteurizer, disc-bowl centrifuge, water vapour transmission rate tester and oxtran, gas chromatograph, high performance liquid chromatograph, headspace sampler, texture analyzer, and Kjeldahl protein digestion and distillation unit.

**COURSE TUTOR:** Halimahton Zahrah Mohd Som

**ACADEMIC STAFF**

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturer</b>			
1.	Halimahton Zahrah Mohd Som	M. Sc. (N. Carolina State U.) B. Sc. Hons. (Reading U.)	Food Science
2.	Zainal Samicho	M. Sc. (Strathclyde U.) B. Sc. Hons. (U.M.)	Food Science & Technology Physics
<b>Lecturer</b>			
1.	Anisah Rafidah Ahmad	M. Sc. (Mississippi State U.) B. Sc. (Iowa State U.)	Food Science & Technology
2.	Cheow Chong Seng	M. Ph. (Leeds U.) B.E. Hons. (U.M.)	Food Engineering
3.	Noriham Abdullah	M. Sc. (Strathclyde U.) B. Sc. Hons. (U.P.M.)	Food Science & Technology
4.	Norizzah Abd. Rashid	M. Sc. (Mississippi State U.) B. Sc. (Iowa State U.)	Food Science & Technology
5.	Dr. Roselina Karim	Ph. D. (Reading U.) M. Sc. (U.P.M.) B. Sc. Hons. (U.K.M.)	Food Science & Nutrition
6.	Siti Noorbaiyah Abd. Malek	M. Sc. (Michigan State U.) B. Sc. (U. of Minnesota)	Food Science & Technology
7.	Woon Kon Sung	M. Sc. (Mysore U.) B. Sc. Hons. (U.M.)	Food Technology
<b>TOTAL</b>			

Notes : Lect - Lecture, Lab - Laboratory, Tut - Tutorial, Exam - Exam

**CURRICULUM**  
**4 YEAR COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
BIO 105	BIOLOGY	4.0	5.0	3.0	2.0
CHM 107	BASIC CHEMISTRY I	4.0	5.0	3.0	2.0
MAT 107	BASIC MATHEMATICS I	4.0	4.0	4.0	0.0
PHY 101	GENERAL PHYSICS I	4.0	5.0	3.0	2.0
ENL 120	FOUNDATION ENGLISH I	2.0	4.0	4.0	0.0
UIS 101/ TIS 100	FOUNDATION OF ISLAM I/ ISLAMIC CIVILIZATION I (HISTORY)	2.0	2.0	2.0	0.0
KKR ***	CO-CURRICULUM	1.0	2.0	0.0	2.0
	<b>TOTAL</b>	<b>21.0</b>	<b>27.0</b>	<b>19.0</b>	<b>8.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
BIO 155	BIOLOGY	4.0	5.0	3.0	2.0
CHM 157	BASIC CHEMISTRY II	4.0	5.0	3.0	2.0
MAT 157	BASIC MATHEMATICS II	4.0	4.0	4.0	0.0
PHY 151	GENERAL PHYSICS II	4.0	5.0	3.0	2.0
ENL 121	FOUNDATION ENGLISH II	2.0	4.0	0.0	0.0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II/ ISLAMIC CIVILIZATION II (THOUGHTS)	2.0	2.0	2.0	0.0
KKR ***	CO-CURRICULUM	1.0	2.0	0.0	2.0
	<b>TOTAL</b>	<b>21.0</b>	<b>27.0</b>	<b>19.0</b>	<b>8.0</b>

**Notes : Lect - Lecture, Lab/Tut - Laboratory Work and/or Tutorial**

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
CHM 200	BASIC ORGANIC CHEMISTRY	4.0	5.0	3.0	2.0
CHM 203	PHYSICAL CHEMISTRY	4.0	6.0	3.0	3.0
FST 109	PRINCIPLE OF FOOD ENGINEERING	3.0	3.0	3.0	0.0
MIC 103	GENERAL MICROBIOLOGY	3.0	4.0	2.0	2.0
QMT 105	BASIC STATISTICS	3.0	3.0	3.0	0.0
ENL 230	INTERMEDIATE ENGLISH I	2.0	4.0	4.0	0.0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING/ ISLAMIC CIVILIZATION III (ETHICS)	2.0	2.0	2.0	0.0
KKR ***	CO-CURRICULUM	1.0	2.0	0.0	2.0
	<b>TOTAL</b>	<b>22.0</b>	<b>29.0</b>	<b>20.0</b>	<b>9.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
FST 167	FOOD PRODUCTION (ANIMAL)	3.0	3.0	3.0	0.0
CHM 256	BASIC ANALYTICAL CHEMISTRY	3.0	5.0	2.0	3.0
CHM 259	BASIC BIOCHEMISTRY	4.0	5.0	3.0	2.0
CMT 159	UNIT OPERATIONS	4.0	5.0	3.0	2.0
FST 186	FOOD QUALITY CONTROL	3.0	4.0	2.0	2.0
MIC 153	GENERAL MICROBIOLOGY	3.0	4.0	2.0	2.0
ENL 231	INTERMEDIATE ENGLISH II	2.0	4.0	4.0	0.0
UIS 251/ TIS 250	ISLAMIC HISTORY AND CIVILIZATION/ ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2.0	2.0	2.0	0.0
KKR ***	CO-CURRICULUM	1.0	2.0	0.0	2.0
	<b>TOTAL</b>	<b>25.0</b>	<b>34.0</b>	<b>21.0</b>	<b>13.0</b>

**Notes : Lect - Lecture, Lab/Tut - Laboratory Work and/or Tutorial**



**YEAR 3**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
FST 127	FOOD PRODUCTION (CROP)	3.0	3.0	3.0	0.0
FST 205	FOOD CHEMISTRY	4.0	5.0	3.0	2.0
FST 218	PRINCIPLE OF FOOD PRESERVATION	4.0	6.0	3.0	3.0
FST 236	FOOD ANALYSIS	2.0	4.0	1.0	3.0
CHM 305	BASIC INSTRUMENTAL ANALYSIS	4.0	6.0	3.0	3.0
QMT 205	INDUSTRIAL STATISTICS	3.0	3.0	3.0	0.0
UIS 303/	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I/				
TIS 300	ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2.0	2.0	2.0	0.0
	<b>TOTAL</b>	<b>22.0</b>	<b>29.0</b>	<b>18.0</b>	<b>11.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 6</b>					
FST 255	FOOD CHEMISTRY	2.0	3.0	1.0	2.0
FST 268	PRINCIPLE OF FOOD PRESERVATION	4.0	6.0	3.0	3.0
FST 282	FOOD PRODUCT DEVELOPMENT	3.0	4.0	2.0	2.0
ETR 300	BASIC ENTREPRENEURSHIP	3.0	3.0	3.0	0.0
MIC 240	FOOD MICROBIOLOGY	4.0	5.0	3.0	2.0
FST 174	NUTRITION	3.0	3.0	3.0	0.0
UIS 353/	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/				
TIS 350	ISLAMIC CIVILIZATION VI (HUMANITIES)	2.0	2.0	2.0	0.0
	<b>TOTAL</b>	<b>21.0</b>	<b>26.0</b>	<b>17.0</b>	<b>9.0</b>

**Notes : Lect - Lecture, Lab/Tut - Laboratory Work and/or Tutorial**

## YEAR 4

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
Part 7					
CSC 133	COMPUTERS AND INFORMATION PROCESSING	3.0	4.0	2.0	2.0
FST 368	FOOD PROCESSING	5.0	8.0	4.0	4.0
FST 173	FOOD SANITATION AND LEGISLATION	3.0	3.0	3.0	0.0
MGT 126	INDUSTRIAL MANAGEMENT	3.0	3.0	3.0	0.0
MKT 117	INTRODUCTION TO MARKETING	3.0	3.0	3.0	0.0
ECO 108	INTRODUCTION TO ECONOMICS	3.0	3.0	3.0	0.0
FST 320	PROJECT	3.0	6.0	0.0	6.0
	TOTAL	23.0	30.0	18.0	12.0

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
Part 8					
FST 351	PRACTICAL TRAINING	12.0	6 MONTHS		
	TOTAL	12.0			
	GRAND TOTAL	167.0	202.0	132.0	70.0

Notes : Lect - Lecture, Lab/Tut - Laboratory Work and/or Tutorial

## DESCRIPTION OF SUBJECTS

### YEAR 1 (4 - YEAR COURSE)

- \* BIO 105 BIOLOGY
- \* CHM 107 BASIC CHEMISTRY I
- \* MAT 107 BASIC MATHEMATICS I
- \* PHY 101 GENERAL PHYSICS I
- \* ENL 120 FOUNDATION ENGLISH I

- \* UIS 101 FOUNDATION OF ISLAM I
- \* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)
- \* BIO 155 BIOLOGY
- \* CHM 157 BASIC MATHEMATICS II
- \* PHY 151 GENERAL PHYSICS II
- \* ENL 121 FOUNDATION ENGLISH II
- \* UIS 151 FOUNDATION OF ISLAM II
- \* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)

**YEAR 2****FST 109 PRINCIPLE OF FOOD ENGINEERING**

The subject deals with the study of the principles of food engineering. Topics covered include conversion of units, mass balance energy, flow sheet and flow diagram, heat transfer, thermodynamics, use of steam tables, fluid flow, pumps, material of construction, instrumentation and cleaning operation in food industry.

**MIC 103 GENERAL MICROBIOLOGY**

This is an introductory subject on the general biology of microorganisms and the fundamental principles of microbiological techniques with emphasis on bacteria. Topics covered include the history and personalities involved in the development of microbiology; the use of microscope with emphasis on the brightfield microscope; morphology and general biology of bacteria; cultivation of bacteria; pure culture techniques; bacterial population measurement; basic bacterial metabolism and genetics; media used in bacteriological work and control of microorganisms.

- \* CHM 200 BASIC ORGANIC CHEMISTRY
- \* CHM 203 PHYSICAL CHEMISTRY
- \* QMT 105 BASIC STATISTICS
- \* ENL 230 INTERMEDIATE ENGLISH I
- \* UIS 201 CONTEMPORARY ISLAMIC THINKING
- \* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

**FST 167 FOOD PRODUCTION (ANIMAL)**

This is a basic course which deals in detail with production of food from animals and also covers various aspects pertaining to the principles involved in the rearing and management of beef and dairy cattle. Quality factors involved in production of quality beef and milk are stressed.

The poultry industry with particular emphasis on production of broilers and layers are adequately covered.

Goat and sheep rearing in the tropics and problems associated with this sector are emphasized.

\* refer to page 12-16

## CMT 159 UNIT OPERATIONS

This subject deals with the principles and methods of operation of : Centrifugation, filtration, leaching, expression, size reduction, cutting and slicing , mixing, heat transfer in food industry, evaporation, cleaning and sorting of food raw materials.

## FST 186 FOOD QUALITY CONTROL

This is an introduction to food quality control. The importance of quality control in the food industry is stressed. Various aspects of basic quality problems involved, different controls exercised and techniques used in assessing quality are covered.

## MIC 153 GENERAL MICROBIOLOGY

This subject is a continuation of General Microbiology (MIC 103). The syllabus covers topics such as host parasite relationship; introductory lectures on moulds, yeasts and viruses. The second part of the syllabus mainly deals with introductory lectures on soil microbiology, water microbiology (including waste/sewage treatment), food microbiology and the uses of microorganisms in industries.

### \* CHM 256 BASIC ANALYTICAL CHEMISTRY

### \* CHM 259 BASIC BIOCHEMISTRY

### \* ENL 231 INTERMEDIATE ENGLISH II

### \* UIS 251 ISLAMIC HISTORY AND CIVILIZATION

### \* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

## YEAR 3

## FST 127 FOOD PRODUCTION (CROP)

This is an introductory course in crop production. This course provides understanding of all factors related to crop yield. These include environmental, biochemical, physiological and management factors.

Introduction to food crops and their utilization are also covered.

## FST 205 FOOD CHEMISTRY

The subject involves the study of food commodities from a chemical standpoint. The primary emphasis is on their composition and the changes that occur during their processing, distribution and storage. The food commodities covered include: oils and fats, meat, fish, egg, milk, cereals and flour, and fruits and vegetables. Browning reactions are also covered.

## FST 218 PRINCIPLE OF FOOD PRESERVATION

The subject includes introduction to food processing, study of deteriorative factors of food constituents, study of principle of chemical preservation, acidification of foods, preservation of food as sugar concentrate, baking, microwave oven, principle of pasteurisation and sterilisation, canning and irradiation.

\* refer to page 12-16

## FST 236 FOOD ANALYSIS

The subject emphasizes the practical aspects of food analysis. The importance and the principles involved in the determination of the basic constituents of food are discussed.

### \* CHM 305 BASIC INSTRUMENTAL ANALYSIS

### \* QMT 205 INDUSTRIAL STATISTICS

### \* UIS 303 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I

### \* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

### \* FST 255 FOOD CHEMISTRY

The study of the chemical aspects of some selected food components, with emphasis on their characteristics, reactions and stability. Physiological effects and detoxification procedures are also discussed for certain components.

## FST 268 PRINCIPLE OF FOOD PRESERVATION

The subject includes cold preservation of food, requirements for air-conditioning room and cold store, food dehydration, freeze drying, and food packaging.

## FST 282 FOOD PRODUCT DEVELOPMENT

The subject deals with the steps involved in the development of new food products. The topics covered include idea generation and idea screening, product development and positioning, finalization of consumer communications, product commercialization, and sensory evaluation in the development of new products.

## MIC 240 FOOD MICROBIOLOGY

This subject is designed primarily for Food Technology students. It covers various aspects of applying the knowledge they had obtained in General Microbiology to the field of Food Science. Topics like common types of microorganisms found in foods; principles of preservation; and food poisoning are discussed at length. Included are also rudiments of industrial fermentations with examples on production of organic acids, enzymes and Oriental foods.

## FST 174 NUTRITION

Study of major food components - their functions, source and requirements. Physiological processes taking place in the human body, digestion and absorption of food. Dietary needs of individual under different conditions-energy requirements and assessment of nutritional status. Major diseases affecting human beings including deficiency diseases, with particular reference to tropical countries.

### \* ETR 300 BASIC ENTREPRENEURSHIP

### \* UIS 353 HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II

### \* TIS 350 ISLAMIC CIVILIZATION VI (HUMANITIES)

\* refer to page 12-16

## YEAR 4

### ACADEMIC STAFF

#### FST 368 FOOD PROCESSING

This subject provides the students with an understanding of the theoretical and practical aspects of food processing. This syllabus covers the processing and manufacturing of various food commodities such as carbonated and alcoholic beverages, soyabean milk and related products, fermented soyabean products, noodles, cocoa and cocoa products, fruit and vegetable products, meat products and fish products.

#### FST 173 FOOD SANITATION AND LEGISLATION

Study of food hygiene, types of food poisonings brought by bacteria, parasites, viruses and chemicals. Mode of spread of diseases - public health aspects. Hygiene and sanitation in food manufacture and processing. Study of food additives. Detailed study of different codes of practice for food hygiene.

Study of Malaysian Food Laws and comparison with U.K. & U.S.A. laws. Working of Codex Alimentarius and recommended food standards.

#### FST 320 PROJECT

Students are required to carry out an approved investigative project related to food, to be completed by the end of the semester. The project report, together with an oral presentation, will be evaluated and graded.

#### \* CSC 133 COMPUTERS AND INFORMATION PROCESSING

#### \* MGT 126 INDUSTRIAL MANAGEMENT

#### \* MKT 117 INTRODUCTION TO MARKETING

#### \* ECO 108 INTRODUCTION TO ECONOMICS

#### FST 351 PRACTICAL TRAINING

This is a closely supervised practical training at any food-based industry or government agency for a duration of 5 months. On completion of the training, students are expected to submit written reports. The report, together with an oral presentation will be evaluated and graded.

\* refer to page 12-16

# DIPLOMA IN WOOD TECHNOLOGY

YEAR 4

## COURSE DESCRIPTION

In order to meet the shortage of trained and qualified wood technologists for the wood based industries in Malaysia, a four year Diploma in Wood Technology course was introduced at the School of Applied Sciences, Institut Teknologi MARA in 1973. Since then more than 150 students have graduated with a Diploma in Wood Technology. Most of the graduates are holding good positions in the private sector and government institutions. Some graduates have acquired higher qualifications from universities locally and abroad.

The course is a four year or eight semester program with each semester consisting of sixteen weeks. In addition to theoretical and laboratory work at the institute, students are required to undergo practical training at various wood-based industries. This is conducted for four months in the eighth (last) semester. The objective of the practical training is to enable the students to integrate the academic principles that they have learned with actual industrial practice and to familiarize them with the environment of the industries.

Academic visits to wood-based industries are often conducted. Students are also required to carry out a project as a partial requirement for the diploma.

## CAREER PROSPECTS

The graduates from this course are accepted into the Government Service as Technical Assistants and Junior Research Officers and in the Wood-Based Industries as Production Supervisors, Quality Controllers, Marketing Executives and Technical Assistants.

## OPPORTUNITIES FOR FURTHER STUDIES

Graduates of this course can further their studies locally or abroad in various areas such as Marketing, Accountancy, Business & Management, Forest Industries, Wood Science & Technology and related areas.

## FACILITIES AVAILABLE

Well equipped laboratories and workshops are available for pulp and paper making/analysis, mechanical properties analysis, wood anatomy and timber identification, wood preservation treatment, wood drying, wood machining, wood finishing, wood composite making/analysis and other related wood processing techniques.

**ACADEMIC STAFF**

No.	Name	Qualification	Credit	Area of Specialization
<b>Senior Lecturers</b>				
1.	Abd. Jalil Ahmad	M. Sc. (State U. New York) B.Sc. For. (Australian National U.)		Wood Product Engineering
2.	Ashari Abd. Jalil	B.Sc. For (U. Auckland) M.W.P.S. (North Carolina State U.)		Wood Products
3.	Jamaludin Kasim	M. For (U. Philippines Los Banos) Dip. Wood Tech. (I.T.M)		Wood Chemistry
4.	Kasani Yusuf	M. Sc. (U. Wales) B.Sc. For. (U.P.M) Dip. For. (I.T.M)		Furniture Marketing
<b>Lecturers</b>				
1.	Chen Fung Woo	M. Ag. (U. Ghent) B. Sc. Hons. (U.M)		Particleboard
2.	Mansur Ahmad	M. Sc. For. & Wood Sc. (Colorado State U.) B.Sc. Wood Tech. (U. Maine) Dip. Wood Tech. (I.T.M)		Timber structure
3.	Mohd. Nazip Suratman	M.Sc. For. (U. Nebraska) B.Sc. For. Hons. (U.P.M)		Forest Management
4.	Shaikh Abd. Karim Yamani	M. Phil. Wood Sc. (U. Wales) B. Sc. Hons. Wood Sc(U. Wales) Dip. Wood Tech. (I.T.M)		Wood Composite
5.	Dr. Suhaimi Muhammed	Ph. D. (U. Aberdeen) M. Sc. Wood Sc. & Tech. (U. Philippines Los Banos) Dip. Wood Tech. (I.T.M)		Wood Anatomy
			1.0	2.0
<b>TOTAL</b>			<b>21.0</b>	<b>10.0</b>

Notes : Lect. Lectures, Laboratory, and other activities are included in the credit hours.



**CURRICULUM**  
**4 - YEARS COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
BIO 105	BIOLOGY	4.0	5.0	2.0	3.0
CHM 107	CHEMISTRY	4.0	5.0	2.0	3.0
MAT 107	MATHEMATICS	4.0	4.0	0.0	4.0
PHY 101	PHYSICS	4.0	5.0	2.0	3.0
ENL 120	FOUNDATION ENGLISH I	2.0	4.0	0.0	4.0
UIS 101/ TIS 100	FOUNDATION OF ISLAM II/ ISLAMIC CIVILIZATION I (HISTORY)	2.0	2.0	0.0	2.0
KKR ***	CO-CURRICULUM	1.0	2.0	2.0	0.0
	<b>TOTAL</b>	<b>21.0</b>	<b>27.0</b>	<b>8.0</b>	<b>19.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
CHM 157	CHEMISTRY	4.0	5.0	2.0	3.0
MAT 157	MATHEMATICS	4.0	4.0	0.0	4.0
PHY 151	PHYSICS	4.0	5.0	2.0	3.0
ENL 121	FOUNDATION ENGLISH II	2.0	4.0	0.0	4.0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II/ ISLAMIC CIVILIZATION II (THOUGHTS)	2.0	2.0	0.0	2.0
KKR ***	CO-CURRICULUM	1.0	2.0	2.0	0.0
	<b>TOTAL</b>	<b>21.0</b>	<b>27.0</b>	<b>8.0</b>	<b>19.0</b>

**Notes : Lect-Lecture, Lab/Tut. - Laboratory work and /or Tutorial.**

**YEAR 2.**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
CHM 200	ORGANIC CHEMISTRY	4.0	5.0	2.0	3.0
WTE 102	BASIC FORESTRY	4.0	7.0	4.0	3.0
ECO 108	ECONOMIC	3.0	3.0	0.0	3.0
UIS 201/ TIS 200	CONTEMPORARY ISLAMIC THINKING/ ISLAMIC CIVILIZATION III (ETHICS)	2.0	2.0	0.0	2.0
WTE 103	WOOD MECHANICS	3.0	4.0	2.0	2.0
ACC 108	ACCOUNTING	3.0	3.0	0.0	3.0
CSC 133	COMPUTER AND INFORMATION PROCESSING	3.0	4.0	2.0	2.0
KKR ***	CO-CURICULUM	1.0	2.0	0.0	2.0
	<b>TOTAL</b>	<b>23.0</b>	<b>30.0</b>	<b>12.0</b>	<b>18.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
WTE 215	WOOD CHEMISTRY	3.0	6.0	4.0	2.0
QMT 205	INDUSTRIAL STATISTICS	3.0	3.0	0.0	3.0
MEN 120	TECHNICAL DRAWING	3.0	5.0	4.0	1.0
QMT 105	STATISTICS	3.0	3.0	0.0	3.0
WTE 201	WOOD ANATOMY	3.0	3.0	0.0	3.0
ENL 230	INTERMEDIATE ENGLISH	3.0	4.0	0.0	4.0
UIS 251/ TIS 250	ISLAMIC HISTORY AND CIVILIZATION/ ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2.0	2.0	0.0	2.0
KKR ***	CO-CURICULUM	1.0	2.0	2.0	0.0
	<b>TOTAL</b>	<b>21.0</b>	<b>28.0</b>	<b>10.0</b>	<b>18.0</b>

**Notes : Lect. Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

**YEAR 3**

YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
WTE 155	ADHESIVE AND ADHESION	3.0	3.0	0.0	3.0
WTE 205	MACHINING AND SAWMILLING	5.0	10.0	6.0	4.0
UIS 303/ TIS 300	HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2.0	2.0	0.0	2.0
ENL 231	INTERMEDIATE ENGLISH II	2.0	4.0	0.0	4.0
WTE 208	WOOD PHYSICS	1.0	2.0	2.0	0.0
WTE 255	WOOD SEASONING AND PRESERVATION	5.0	10.0	6.0	4.0
WTE 212	PLYWOOD TECHNOLOGY	4.0	9.0	6.0	3.0
	<b>TOTAL</b>	<b>22.0</b>	<b>40.0</b>	<b>20.0</b>	<b>20.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 6</b>					
WTE 360	DESIGN OF TIMBER STRUCTURE	3.0	4.0	2.0	2.0
ACC 163	COSTING	3.0	3.0	3.0	3.0
WTE 302	PULP AND PAPER - THEORY	4.0	4.0	4.0	4.0
WTE 355 UIS 353/	PARTICLEBOARD TECHNOLOGY HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM II/	4.0	9.0	3.0	3.0
TIS 350	ISLAMIC CIVILIZATION VI (HUMANITIES)	2.0	2.0	2.0	2.0
WTE 259	FURNITURE PRODUCTION	4.0	7.0	3.0	3.0
	<b>TOTAL</b>	<b>20.0</b>	<b>29.0</b>	<b>17.0</b>	<b>17.0</b>

**Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial**

**YEAR 4**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 7</b>					
WTE 258	TIMBER TRADE PRACTICE	3.0	3.0	0.0	3.0
WTE 352	PULP AND PAPER LABORATORY	2.0	5.0	4.0	1.0
ETR 300	BASIC ENTREPRENEURSHIP	3.0	3.0	0.0	3.0
MGT 126	INDUSTRIAL MANAGEMENT	3.0	3.0	0.0	3.0
MKT 117	MARKETING	3.0	3.0	0.0	3.0
WTE 207	ENVIRONMENTAL PROTECTION	2.0	2.0	0.0	2.0
WTE 301	SEMINAR	1.0	1.0	0.0	1.0
	<b>TOTAL</b>	<b>17.0</b>	<b>20.0</b>	<b>4.0</b>	<b>16.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 8</b>					
WTE 304	INDUSTRIAL TRAINING	12.0	6 month		
	<b>TOTAL</b>	<b>12.0</b>			
	<b>GRAND TOTAL</b>	<b>162.0</b>	<b>259.0</b>	<b>132.0</b>	<b>127.0</b>

**Notes: Lect. - Lecture, Lab./Tut. - Laboratory work and/or Tutorial**

## DESCRIPTION OF SUBJECTS

YEAR 4

### 4 - YEAR COURSE

#### YEAR 1

- \* BIO 105 BIOLOGY
- \* CHM 107 BASIC CHEMISTRY I
- \* MAT 107 BASIC MATHEMATICS I
- \* PHY 101 GENERAL PHYSICS I
- \* ENL 120 FOUNDATION ENGLISH I
- \* UIS 101/ FOUNDATION OF ISLAM II/  
\* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)

\* BIO 155 BIOLOGY

\* CHM 157 BASIC CHEMISTRY II

\* MAT 157 BASIC MATHEMATICS II

\* PHY 151 GENERAL PHYSICS II

\* ENL 121 FOUNDATION ENGLISH II

\* UIS 151/ FOUNDATION OF ISLAM II/  
\* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)

#### YEAR 2

\* CHM 200 BASIC ORGANIC CHEMISTRY

\* ECO 108 INTRODUCTION TO ECONOMICS

\* UIS 201/ CONTEMPORARY ISLAMIC THINKING/

\* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

#### ACC 108 ACCOUNTING

This subject introduces students to accounting principles, principles of double entry, books of accounts, bank reconciliation, balance day adjustments, preparation of final accounts and balance sheet.

\* CSC 133 COMPUTER AND INFORMATION PROCESSING

\* QMT 205 INDUSTRIAL STATISTICS

\* Refer to page 12-16

## **MEN 120 TECHNICAL DRAWING**

The introductory course deals with the use of drawing instruments, lettering, lines, dimensioning, principles of orthographic projection, sectioning, isometric drawing, developments of surfaces, assembly drawings and geometrical constructions.

\* QMT 105 STATISTICS

\* ENL 230 INTERMEDIATE ENGLISH

\* UIS 251/ ISLAMIC HISTORY AND CIVILIZATION/

\* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

## **WTE 102 BASIC FORESTRY**

The subject guides students in understanding the many facets of forest management, understanding the forest which is the main source of wood for processing, and to understand the attributes of wood and its uses.

## **WTE 103 WOOD MECHANIC**

This course involves a quick revision of mechanics (forces, stress, strain, elasticity, equilibrium) derivation of basic and design stress for wood, analysis of beams, trusses and columns.

## **WTE 201 WOOD ANATOMY**

This subject introduces the students to the identification of major commercial woods in Malaysia by analyzing the physical and anatomical features of the woods.

## **WTE 215 WOOD CHEMISTRY**

This is an introductory course in Wood Chemistry. The syllabus covers the study of the chemistry of wood components, carbohydrates, cellulose, hemicellulose, lignin and extractives.

## **YEAR 3**

\* UIS 303/ HISTORY AND PHILOSOPHY OF SCIENCE IN ISLAM I

\* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

\* ENL 231 INTERMEDIATE ENGLISH II

## **ACC 163 COSTING**

This subject introduces students to the types of costing units; job costing, process costing, basic principles of costing statements; depreciation of assets; breakeven valuation, marginal costing and method of application.

\* Refer to page 12-16

- \* UIS 353/ HISTORY AND PHILOSOPHY OF SCIENCE
- \* TIS 350 IN ISLAM II/  
ISLAMIC CIVILIZATION VI (HUMANITIES)

#### **WTE 155 ADHESIVES AND ADHESION**

This is an intensive course on adhesives used in woodbased industries. The syllabus covers the fundamentals of adhesives and film formation, the preparation, uses and properties of important adhesives and also the testing of adhesives and coatings.

#### **WTE 212 PLYWOOD TECHNOLOGY**

This course introduces students to the processes involved in plywood manufacturing. The syllabus covers the pre-conditioning processes, peeling, reeling, drying, jointing, splicing, assembling, hot and cold pressing, finishing and quality control.

#### **WTE 205 MACHINING AND SAWMILLING**

The course provides a basic knowledge in the design and operation of a sawmill and the practice of wood machining. The syllabus includes the various types of sawmills and sawmilling machineries, sawmilling methods, types of saw for sawntimber production, saw maintainance and saw doctoring, sawmill layout, machineries and equipment for wood working and their application.

#### **WTE 208 WOOD PHYSICS**

This course provides the necessary background in the physical properties of water. Emphasis is placed on wood moisture relationship, the physics of water, wood moisture and environment, shrinkage and swelling.

#### **WTE 255 WOOD SEASONING AND PRESERVATION**

This course provides a basic knowledge in timber preservation, seasoning practices and development. The syllabus covers wood deterioration, plant design, operation and control, various techniques of timber preservation and seasoning, defects, evaluation and recent development in this field.

#### **WTE 259 FURNITURE PRODUCTION**

This subject introduces the students to the subject of furniture-making and its management, together with the problems and some remedial actions.

#### **WTE 302 PULP AND PAPER TECHNOLOGY THEORY**

This is an introductory course on pulp and paper. The syllabus includes the study of raw materials, pulping methods, bleaching process and also how paper is being manufactured.

#### **WTE 355 PARTICLEBOARD TECHNOLOGY**

The course introduces students to the general aspects of the manufacture of particleboard and its related products. It aims to familiarise the students to the various properties and methods of testing and the practical method of making particleboard. Visits to particleboard manufacturing factories will also be included in the course.

\* Refer to page 12-16

## WTE 360 THE DESIGN OF TIMBER STRUCTURE

This course introduces students of wood technology to timber design and construction. The topics covered include elastic theory, basic stresses, beam, column and trusses design, fastening and timber connectors and exterior structures. Emphasis is placed on the design of structural members of either solid or composite wood.

### YEAR 4

- \* ETR 300 BASIC ENTREPRENEURSHIP
- \* MGT 126 INDUSTRIAL MANAGEMENT
- \* MKT 117 INTRODUCTION TO MARKETING

## WTE 207 ENVIRONMENTAL PROTECTION

This is an introductory course in pollution and environmental protection. The syllabus includes air, water, noise pollution and solid waste management. Sources, nature and effects of pollutants, sampling techniques and methods of control are discussed.

## WTE 258 TIMBER TRADE PRACTICE

The course exposes students to the structure of the Timber Trade: both local and export. The syllabus covers, contracts, shipping, insurance, commercial grading, trade calculations, custom procedure, documentation and case studies.

## WTE 301 SEMINAR

This course provides the basic techniques of preparing research papers or reports on scientific or technical subjects. The syllabus covers the choice of subject, using the library, preparing a bibliography, taking notes, composing the paper, data gathering and analysis, and preparing the final version or draft.

## WTE 304 INDUSTRIAL TRAINING

The industrial training programme requires students to undergo 4 months training in various wood industries. During their training they will each undertake a research project to develop their interest in the various fields.

## WTE 351 PROJECT

The students are required to carry out a project during their industrial training period. The project to be carried out is to upgrade and expose the students to the actual working environment. The programme will also develop the mutual relationship and cooperation between the industries and the students themselves.

## WTE 352 PULP AND PAPER TECHNOLOGY LABORATORY

This course covers the manufacture of pulp and paper in the laboratory. It includes chemical analysis, testing of raw materials and paper.

\* Refer to page 12-16



# DIPLOMA IN TEXTILE TECHNOLOGY

## COURSE DESCRIPTION

The Diploma in Textile Technology course, a three year programme, was introduced at the School of Applied Sciences in 1974. This course deals with the manufacture and production of textile materials in the form of yarns, threads and fabrics. The subjects offered are carefully selected to meet the needs of the textile industry. The technical core subjects taught are Spinning, Weaving, Knitting, Finishing, Fabric Structure and Textile Testing. Subjects such as Physics, Chemistry, Mathematics and Statistics provide the technical foundation for this course. Other subjects such as Industrial Management, Economics, Computer Science and Entrepreneurship are also taught so that a graduate of Diploma in Textile Technology can cope with the fast changing environment in textile industries.

All students are required to undergo a 20-week (1 semester) industrial training in local textile mills. This is done while they are in Part V to enable them to gain the experience and knowledge in the relevant areas.

## CAREER PROSPECTS

Graduates from this course can initially be employed in textile firms in the various sections like Spinning, Weaving, Knitting, Finishing, Dyeing and Quality Control as supervisors or equivalent posts. With experience and hard work, they can go up further to hold posts as Assistant Managers or Managers.

## OPPORTUNITIES FOR FURTHER STUDIES

Graduates are able to further their studies particularly in higher institutions abroad in Textile Technology or related areas, particularly in the United States of America and United Kingdom.

## FACILITIES AVAILABLE

There are five textile laboratories available for practical classes and projects. These include Laboratories for Spinning, Weaving, Knitting, Quality Control and Testing as well as a Chemical Textile Laboratory. Most of the equipment in the laboratories are modern and sophisticated.

**COURSE TUTOR:** Salmiah Mohd. Nor

## ACADEMIC STAFF

No.	Name	Qualifications	Area of Spectalization
<b>Senior Lecturers</b>			
1.	Jamaluddin Muhammad	Master in Textiles, (N. Carolina State U.) Ing. Grad. (Fachhochschule Niederrhein, W. Germany)	Textiles Textile Technology
2.	Jamil Salleh	M.Sc. (S.E. Massachusettes U.) B.Sc. (Philadelphia College of Textiles & Science)	Textile Technology Textile Technology
3.	Salmiah Mohd. Nor	M.Sc. (Florida State U.) B.Sc. (U. California Davis)	Clothing And Textiles
<b>Lecturers</b>			
1	Khadijah Omar	M.Sc. (U. Of Leeds) B.Sc. (U. of Western Ontario)	Dyeing And Finishing Chemistry

No.	Name	Qualifications	Areof Spectalization
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2.	Siti Marsinah Tumin	M.Sc. (S.E. Massachusettes U.) B.Sc. (Philadelphia College of Textiles & Science)	Textile Technology Textile Technology
3.	Wan Yunus Wan Ahmad	M.Sc. (U. of Leeds) B.Sc. (Philadelphia College of Textiles & Science)	Textile Finishing Textile Chemistry

## CURRICULUM 3 YEAR COURSE

### YEAR 1

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
CHM167	CHEMISTRY FOR TECHNOLOGY	4	5	3	2
MAT107	BASIC MATHEMATICS 1	4	4	4	0
MEN120	TECHNICAL DRAWING	2	4	0	4
PHY101	GENERAL PHYSICS 1	4	5	3	2
ENL120	FOUNDATION ENGLISH 1	2	4	4	0
UIS101/ TIS 100	FOUNDATION OF ISLAM I / ISLAMIC CIVILIZATION I (HISTORY)	2	2	2	0
KKR***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>19</b>	<b>26</b>	<b>16</b>	<b>10</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
ECO108	INTRODUCTION TO ECONOMICS	3	3	3	0
MAT157	BASIC MATHEMATICS II	4	4	4	0
PHY151	GENERAL PHYSICS II	4	5	3	2
TXL115	BLOWROOM AND CARDING	4	5	3	2
TXL177	CHEMISTRY OF FIBRES & DYES	3	3	3	0
ENL121	FOUNDATION ENGLISH II	2	4	4	0
UIS151/ TIS 150	FOUNDATION OF ISLAM II / ISLAMIC CIVILIZATION II (THOUGHTS)	2	2	2	0
KKR***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>23</b>	<b>28</b>	<b>22</b>	<b>6</b>

Notes: Lect. - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
QMT105	BASIC STATISTICS	3	3	3	0
CSC133	COMPUTER & INFORMATION PROCESSING	3	4	2	2
TXL165	DRAW FRAMES & COMBERS	4	5	3	2
TXL202	WEAVING PREPARATION	4	5	3	2
TXL219	KNITTING TECHNOLOGY	4	5	3	2
ENL230	INTERMEDIATE ENGLISH 1	2	4	4	0
UIS201/ TIS 200	CONTEMPORARY ISLAMIC THINKING III / ISLAMIC CIVILIZATION III (ETHICS)	2	2	2	0
KKR***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>23</b>	<b>30</b>	<b>20</b>	<b>10</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
TXL157	TEXTILE CALCULATIONS	2	2	2	0
TXL215	SPEEDFRAME & RING FRAME	4	5	3	2
TXL225	TEXTILE FINISHES	3	5	2	3
TXL252	PRINCIPLES OF WEAVING	4	5	3	2
MGT126	INDUSTRIAL MANAGEMENT	3	3	3	0
ENL231	INTERMEDIATE ENGLISH II	2	4	4	0
UIS251/ TIS 250	ISLAMIC HISTORY & CIVILIZATION IV / ISLAMIC CIVILIZATION IV (JURISPRUDENCE)	2	2	2	0
KKR***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>28</b>	<b>19</b>	<b>9</b>

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
TXL301	INDUSTRIAL TRAINING	12	(20 weeks)	0	
	<b>TOTAL</b>	<b>12</b>			

Notes: Lect. - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 6</b>					
TXL302	ADVANCED WEAVING	3	4	2	2
TXL310	SPECIAL TOPICS	2	2	2	0
TXL320	WOVEN FABRIC STRUCTURE	4	4	4	0
TXL330	QUALITY CONTROL & TEXTILE TESTING	4	6	3	3
TXL350	PROJECT	3	5	1	4
ETR300	BASIC ENTREPRENEURSHIP	3	3	3	0
UIS303/ TIS300	HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I / ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
	TOTAL	21	26	17	9
	<b>GRAND TOTAL</b>	<b>119</b>	<b>138</b>	<b>94</b>	<b>44</b>

Notes: Lect. - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## DESCRIPTION OF SUBJECTS

### YEAR 1 (3 YEAR COURSE)

#### CHM 167 CHEMISTRY FOR TECHNOLOGY

This code covers the basic principles in physical, inorganic and organic chemistry. Topics taught in physical chemistry include the atomic theory and mole concept, acid-base and redox reactions. Topics in the inorganic chemistry are the atomic structures, chemical bondings and periodic table. Topics in the organic chemistry include the nomenclatures, structures and a few important reactions in functional groups such as alkanes, alkenes, aromatic hydrocarbons, alkyl halides, hydroxyl, carbonyl and amine compounds.

\* MAT 107 BASIC MATHEMATICS I

#### MEN 120 TECHNICAL DRAWING

The introductory course deals with the use of drawing instruments, lettering, lines, dimensioning, principles of orthographic projection, sectioning, isometric drawing, developments of surfaces, assembly drawings and geometrical constructions.

\* PHY 101 GENERAL PHYSICS I

\* ENL 120 FOUNDATION ENGLISH I

\* UIS 101/

\* TIS 100 FOUNDATION OF ISLAM I / ISLAMIC CIVILIZATION I (HISTORY)

\* ECO 108 INTRODUCTION TO ECONOMICS

\* Refer to page 12-16

\* MAT 157 BASIC MATHEMATICS II

YEAR 2

\* PHY 151 GENERAL PHYSICS II

TXL 115 BLOWROOM AND CARDING

This is the first course in yarn manufacture. It covers the study of functions, operations and calculations in the various processing machines of ginning, opening, cleaning and blending in the blowroom, as well as in carding.

TXL 177 CHEMISTRY OF FIBRES AND DYEST

This is an elementary course on the chemistry of fibres and dyes. The syllabus covers the chemical and related properties of fibres and dyes, with a chance to discuss any new development in the fields of fibres and dyestuffs.

\* UIS 151/ FOUNDATION OF ISLAM II /

\* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)

## YEAR 2

\* QMT 105 BASIC STATISTICS

\* CSC 133 COMPUTER & INFORMATION PROCESSING

TXL 165 DRAW FRAMES AND COMBERS

This is the second part of the syllabus in yarn manufacture. It covers a detailed study of Drawframes and Combers, their functions and operations and related calculations.

TXL 202 WEAVING PREPARATION

The syllabus introduces the student to the preliminary processes of preparing weaver beams in cotton weaving. The subject covers rewinding, warping, sizing, draw-in and pirn winding.

TXL 219 KNITTING TECHNOLOGY

This is a course in weft and warp knitting. The syllabus covers the knitting action, the formation of the various types of knitted fabrics, the types of machines used and related calculations.

\* ENL 230 INTERMEDIATE ENGLISH I

\* UIS 201/ CONTEMPORARY ISLAMIC THINKING/

\* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

TXL 157 TEXTILE CALCULATIONS

The course covers yarn numbering system, plying and twisting. It covers calculations of blending in yarns, warp, weft and fabric weights, costs, and fiber percentages. Simple calculations involved in knitting and weaving are also included.

TXL 215 SPEEDFRAME AND RING FRAME

This is the last part of the syllabus in yarn manufacture. It covers a detailed study of the speed frame and the ring frame, their functions and operations and related calculations.

TXL 225 TEXTILE FINISHES

This subject is a study of various finishes applied onto any textile material either in the form of fiber, yarn

\* Refer to page 12-16

or fabric. The function, the finishing agent used and the method of processing for each finish are also included.

### **TXL 252 PRINCIPLES OF WEAVING**

The syllabus covers the study of primary, secondary and auxiliary motions in weaving (parts and mechanism). Emphasis is also given in adjustment of each mechanism for loom control.

\* ENL 231 INTERMEDIATE ENGLISH II

\* UIS 251/ ISLAMIC HISTORY & CIVILIZATION /

\* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

### **YEAR 3**

#### **TXL 301 INDUSTRIAL TRAINING**

The training is for 20 weeks at any local textile factory. It covers training and learning of specific areas in textile production like spinning, weaving, knitting, finishing, testing and quality control that are available at the factory.

#### **TXL 302 ADVANCED WEAVING**

The syllabus covers advanced level primary motions and auxiliary motions, advanced level weaving principles, production planning and control and weaving defects and their remedy.

#### **TXL 310 SPECIAL TOPICS**

This subject deals with current issues relating to the textile industry and related areas and issues brought up by the industry. It provides the opportunity for students to be involved in seminars and discussions.

#### **TXL 320 WOVEN FABRIC STRUCTURE**

The subject deals with the design and the use of weaves in fabric construction. It also covers weave application for different fabric types and uses. Other topics included are the design, structure and production of pile textiles. Students will also be taught the analysis and the setting of simple fabrics.

#### **TXL 330 QUALITY CONTROL AND TEXTILE TESTING**

The syllabus covers the study of quality control in spinning and weaving. It also covers the physical testing of fibres, yarns and fabrics. Preparation of samples, procedure of testing, calculation and interpretation of results are included for textile testing. Handling of testing equipment is done in the practical classes.

#### **TXL 350 PROJECT**

The project work gives students the opportunity to apply their knowledge by making a full report on any subject related to textiles. Their work will be supervised by a lecturer or lecturers. An oral presentation will be conducted for evaluating their report.

\* ETR 300 BASIC ENTREPRENEURSHIP

\* UIS 303/ HISTORY & PHILOSOPHY OF SCIENCE  
IN ISLAM I /

\* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC  
POLITICAL SYSTEM)

\* Refer to page 12-16

# **DIPLOMA IN SCIENCE**

## **COURSE DESCRIPTION**

This is a preparatory course in basic sciences and mathematics for students to enter the university. The diploma is recognised by the Ministry of Education as equivalent to the Sijil Tinggi Persekolahan Malaysia (STPM).

The Diploma in Science course was introduced at the School of Applied Sciences in the Institut Teknologi MARA in July 1972 to replace the Higher School Certificate programme. The course was conducted in the main campus at first and later introduced to the Perlis and Pahang branch campuses. By July 1995, it will be conducted only in the latter two branch campuses.

The two and a half year course of five semesters offers basic science subjects in Biology, Chemistry, Physics and Mathematics at Sijil Tinggi Persekolahan Malaysia level. In addition to these, subjects like Computers and Information Processing, English, Islamic Studies and Basic Entrepreneurship are also taught in line with the government's vision to encourage more citizens to become entrepreneurs.

The objective of the course is to provide a sound foundation in science education to Bumiputra students so that they can further their education at university level in the field of science and technology or else be further trained in technical skills required by institutions and industries.

## **CAREER PROSPECTS**

Graduates with a Diploma in Science can further their education in Biology - and Chemistry - based careers including Medicine, Dentistry, Veterinary Science, Agronomy, Forestry, Nuclear Science, Biotechnology, Environmental studies, Fisheries, Food Technology or in the Natural Sciences of Biology, Zoology, Botany, Genetics, Ecology etc. Other career opportunities for those with interest in Physics, Chemistry and Mathematics include Engineering (Civil, Electronic, Electrical, Chemical and Mechanical), Industrial Chemistry, Industrial Physics, Nuclear Science, Optometry, Information Technology and Computer Science. Other career options include teaching where graduates would have to undergo a course in Diploma in Education, or working as administrative or management executives or research assistants.

## **OPPORTUNITIES FOR FURTHER STUDIES**

Graduates can further their studies in science-based subjects either in local or foreign universities abroad. The Diploma in Science is recognised by the Ministry of Education as equivalent to STPM. Graduates may be given one year exemption for their Bachelor's Degree programme depending on the course, the university and their CGPA at the Diploma level.

## **FACILITIES AVAILABLE**

Very well equipped laboratories for carrying out practical work in Biology, Chemistry and Physics are available. Students will have access to monocular and binocular microscopes individually. Microscopic slide projector, Over-Head Projectors and slide projectors will be commonly used as Audio-Visual Aids.

**COURSE TUTOR:** Khaw Siok Hooi

**ACADEMIC STAFF  
ITM SHAH ALAM**

No.	Name	Qualification	Area of Specialization
<b>Coordinator of Biology</b>			
4.	Thum Ho Hoe	M.Sc. (U.M.) B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Parasitology
<b>Senior Lecturers</b>			
1.	Izham Abd. Rahim	M.Sc. (U. College North Wales) B.V. Sc., B.Sc. A.H. (U. Punjab)	Parasitology Veterinary Sc. & Animal Husbandry
2.	Khaw Siok Hooi	B.Sc. Hons. (U.M.)	Botany
3.	Loong Swee Choo	B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Zoology
4.	Thum Ho Hoe	M.Sc. (U. Reading) B.Sc. Hons. (U.M.)	Physio. & Biochem of Farm Animals Zoology
5.	Zainon Mohd. Noor	M.Sc. (U. Newcastle Upon Tyne) B.Sc. Hons. (U.M.)	Genetics
<b>Lecturers</b>			
1.	Hamzah Fansuri Hassan	M.Sc. (U. Bridgeport) B.Sc. (State U. New York) Dip. Ed. (U.T.M.)	Biology
2.	Lim It Tean	M.Sc. (U. M.) B.Sc. Hons. (U.M.)	Reptilian Physio. Zoology
3.	Rodziah Ismail	B.Sc. Hons. (U.S.M.)	Zoology
4.	Rohani Abd. Rahim	B.Sc. Hons. (U.M.)	Botany
5.	Zed Zakari Abd. Hamid	B.Sc. Hons. (U.K.M.)	Zoology
<b>Coordinator of Chemistry</b>			
	Faizah Md. Salleh		
<b>Senior Lecturers</b>			
9.	Halila Jasmani	M.Sc. (Northern Illinois U.) B.Sc. (Northern Illinois U.)	Physical Chemistry Biochem



No.	Name	Qualification	Area of Specialization
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#### Lecturers

1.	Ahmad Sazali Hamzah	M.Sc. (U.P.M.) B.Sc. Hons. (U. Liverpool) Cert. Ed. (U.S.M.)	Organic Chemistry
2.	Faizah Md. Salleh	M.Sc. (U.M.) B.Sc. Hons. (Carleton U.)	Chemistry
3.	Ho Sun Seng	B.Sc. Hons. (U.M.)	Chemistry
4.	Kamariah Muda	B.Sc. Hons. (U.K.M.)	Chemistry
5.	Kasmawati Mohammad	B.Sc. Hons. (Stirling U.)	Chemistry
6.	Mashita Abdullah	B.Sc. Hons. (Newcastle Upon Tyne Polytechnic)	Analytical Chemistry
7.	Mohd Fauzi Sufian	B.Sc. Hons. (U.K.M.)	Chemistry
8.	Rohaya Ahmad	M.Sc. (California State U.) B.A. (Knox College)	Chemistry
9.	Ruhani Ibrahim	B.Sc. Hons. (U.K.M.) D.I.C. (I.T.M.)	Chemistry
10.	Ruziyati Tajuddin	B.Sc. Hons. (U.K.M.)	Chemistry
11.	Wong Ah Ngau	M.Sc. (U. East Anglia) B.Sc. Hons. (U.M.)	Organic Chemistry

#### Coordinator of Mathematics

Nora Zakaria

#### Senior Lecturers

1.	Che Jusoh Long	M.Sc. (U. Newcastle Upon Tyne) B.Sc. Hons. (U.M.)	Mathematics
2.	Masriah Awang	M.Sc. (U.K.M.) B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Mathematics
3.	Moo Shiew Leng	M.Sc. (U. Leeds) B.Sc. (U.M.)	Statistics & Mathematics
4.	Tong Swee Foong	M.Sc. (U.M.) B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Mathematics

#### Lecturers

1.	Che Noorlia Noor	M.Sc. (Western Illinois U.) B.Sc. (Western Illinois U.)	Mathematics (Pure)
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No.	Name	Qualification	Area of Specialization
2.	Maheran Nuruddin	M.Sc. (U. Newcastle Upon Tyne) B.Sc. Hons. (U.M.) D.I.S. (I.T.M.)	Mathematics
3.	Nora Zakaria	M.Sc. (U. East Anglia) B.Sc. Hons. Ed. (U.T.M.) Dip. Sc. Ed. (U.T.M.)	Applied Mathematics (Modelling)
4.	Noraziah Abdul Aziz	B.Sc. Hons. Ed. (U.T.M.) Dip. Sc. Ed. (U.T.M.)	Mathematics
<b>Coordinator of Physics</b>			
	Tam See Ngah		
<b>Senior Lecturers</b>			
1.	Beh Kian Lim	M.Sc. (U. York) B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Physics Education Physics
2.	Samirah Abdul Rahman	M.Sc. (South Illinois U.) B.Sc. (South Illinois U.)	Physics
3.	Sulaiman Shaari	M.Sc. (U. Missouri) B.Sc. (Kansas State U.)	Physics
4.	Zawajer Abdul Ghani	B.Sc. (U. Iowa)	Physics
<b>Lecturers</b>			
1.	Ahmad Kamal Hayati Yahya	M.Sc. (Northern Illinois U.) B.Sc. (Ohio U.) Cert. City & Guilds	Physics
2.	Hor Foo Wai	B.Sc. (U.M.) Dip. Ed. (U.M.)	Physics
3.	Jaafar Jantan	Ph. D. (Kansas State U.) M.Sc. (Kansas State U.) B.Sc. (Kansas State U.)	Physics Education Physics
4.	Mohd. Kamil Abdul Rahman	B.Sc. Hons. (U.S.M.)	Physics
5.	Nor Zaini Ikrom Zakaria	M.Sc. (U. Missouri) B.Sc. (College of Charleston)	Physics
6.	Rozana Mohd Dahan	B.Sc. Hons. (U.M.)	Physics
7.	Sakina Farikhullah Khan	B.Sc. Hons. (U.M.)	Physics
8.	Tam See Ngah	M.Sc. (U. St. Andrews) B.Sc. Hons. (U.M.) Dip. Ed. (U.M.)	Laser
9.	Zainazlan Md. Zain	M.Sc. (U.K.M.) B.Sc. Hons. (U.M.)	Energy

**COURSE TUTOR:** Mohd Supi b. Musa

**ACADEMIC STAFF  
ITM PAHANG BRANCH CAMPUS**

No.	Name	Qualification	Area of Specialization
<b>Coordinator of Biology</b>			
	Hafizah bt. Kassim		
<b>Lecturers</b>			
1.	Ainun Jariah Manaf B.Sc. (Western Illinois U.)	M.Sc. (Western Illinois U.) Biology	Biology
2.	Hafizah bt. Kassim	B.Sc. Hons. (U.K.M.)	Zoology
3.	Y.M. Tengku Elida Tengku Zainal Mulok	M.Sc. (Georgia State U.) B.Sc. (Kansas State U.)	Microbiology Biology
4.	Mohd. Noor Ramlan	M.Sc. (U.K.M.) B.Sc. Hons. (U.K.M.)	Environmental Biology Botany
5.	Mohd Supi b. Musa B.Sc. Hons. (U.M.)	M.Sc. (U.M.) Pharmacology	Phytochemistry & Botany
<b>Coordinator of Chemistry</b>			
	Mohd Tahir Abas		
<b>Lecturers</b>			
1.	Mohamad Kamal Harun	M.A. (U. Northern Iowa) B.A. (Knox College) D.I.S. (I.T.M.)	Chemistry Chemistry
2.	Mohd Tahir Abas	M.A. (U. Arkansas) B.A. (California State U. Stanislaus)	Chemistry Chemistry
3.	Mohd. Zahari Abdullah @ Rafie	M.Sc. (U.T.M.) B.Sc. Hons. (U.K.M.)	Analytical Chemistry Chemistry.
4.	Roslina Yaakub	B.Sc. (Brunel U.)	Applied Biochemistry
<b>Coordinator of Physics</b>			
	Ahmad Saat		
<b>Lecturers</b>			
1.	Abdul Aziz Mansor	B.Sc. Hons. (U.K.M.)	Physics
2.	Abu Hassan Husin	M.Sc. (Ohio U.) B.Sc. (Ohio U.) Dip. in Translation (DBP-PPM)	Physics Physics English-Malay

No.	Name	Qualification	Area of Specialization
3.	Ahmad Saat	M.Sc. (U.S.M.) B.Sc. Ed. Hons. (U.S.M.) Dip. in Translation (DBP-PPM)	Radiation Physics Physics Science & Technology
4.	Aniszawati Aziz	B.Sc. Hons. (U.K.M.) Dip. Ed. (U.K.M.)	Physics
5.	Badrul Hisham Mohd. Nor	M.Sc. (U. Wales) B.Sc. Hons. (U.S.M.)	Energy Physics
6.	Mohamad Noor Hj. Badar Sher	B.Sc. Hons. (U.K.M.)	Physics
7.	Syed Yusainee Syed Yahya	B.Sc. Hons. (U.K.M.)	Physics

**COURSE TUTOR:** Mohd Shukri Ismail

**ACADEMIC STAFF**  
**ITM PERLIS BRANCH CAMPUS**

No.	Name	Qualification	Area of Specialization
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**Coordinator of Biology**

Abdul Hamid Khalid

**Lecturers**

1.	Abdul Hamid Khalid	B.Sc. Hons. (U.S.M)	Parasitology
2.	Abdul Razak Abdul Rahman	M.Sc. (U.K.M.) B.Sc. Hons. (U.K.M.)	Zoology
3.	Hamidah Jaafar Sidek	B.Sc. Hons. (U.M.)	Botany
4.	Norsila Daim	M.Sc. (U.S.M.) B.Sc. Hons. (U.S.M.)	Zoology

**Coordinator of Chemistry**

Che Faridah Osman

**Lecturers**

1.	Azlan Yusof	M.Sc. Ed. (North California U. at Las Vegas) B.Sc. (North California U. at Las Vegas)	Chemistry
2.	Che Faridah Osman	B.Sc. Hons. (U.K.M.)	Chemistry
3.	Khudzir Ismail	Ph.D. (Strathclyde U.) M.Sc. (Western Illinois U.) B.Sc. (Western Illinois U.)	Fossil Fuel

No.	Name	Qualification	Area of Specialization
4.	Lim Boon Teik	B.Sc. Hons. (U.S.M.)	Chemistry
5.	Md. Lias Kamal	B.Sc. Hons. (U.K.M.)	Chemistry
6.	Mohd Nizar Hassan	M.Sc. (Florida Inst. of Technology) B.Sc. (Western Virginia U.)	Chemical Engineering
7.	Mohd Shukri Ismail	M.Sc. (Western Illinois U.) B.Sc. (Western Illinois U.)	Analytical Chemistry
8.	Rohaiza Mohamad	B.Sc. Hons (U.K.M.)	Chemistry
9.	Rozita Osman	B.Sc. Hons. (U.K.M.)	Chemistry
10.	Zaini Yusof	M.Sc. (Western Illinois U.) B.Sc. (Western Illinois U.)	Physical Chemistry
11.	Zurina Mahmud	M.Sc. (U.P.M.) B.Sc. (Monash U. Australia)	Natural Products

#### Coordinator of Physics

Zainor Rahim Hassan

#### Lecturers

1.	Abdul Rahim Warris	M.Sc. (Southern Illinois U.) B.Sc. (Southern Illinois U.)	Physics
2.	Ahmad Abdul Hamid	M.Sc. (Indiana State U.) B.Sc. (Indiana State U.)	Physics
3.	Hamidi Abdul Hamid	M.Sc. (U. California) B.Sc. (U. California)	Superconductors
4.	Mahadzir Din	M.Sc. (U. Surrey) B.Sc. (U.K.M.)	Superconductors
5.	Mohd Nazari Abu Bakar	B.Sc. Hons. (U.T.M.)	Physics
6.	Mohd Radzi Abdul Wahab	M.Sc. (Northern Illinois U.) B.Sc. (Northern Illinois U.)	Physics
7.	Ramani a/l Mayappan	B.Sc. Hons. (U.K.M.)	Physics
8.	Saad Mohamad	M.Sc. (U. Reading) B.Sc. Hons. (U.M.)	Energy
9.	Wan Kamariah Wan Abd. Rahman	M.Sc. (Oklahoma State U.) B.Sc. (Oregon State U.)	Physics
10.	Zainor Rahim Hassan	B.Sc. Hons. (U.K.M.)	Physics

**CURRICULUM**  
**2½ YEAR COURSE**

YEAR 2

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
BIO 103	CELL BIOLOGY & PHYSIOLOGY I	4	5	3	2
CHM 128	CHEMISTRY	4	5	3	2
MAT 113	INTRODUCTORY MATHEMATICS I	4	4	4	0
PHY 104	PHYSICS (MECHANICS I & HEAT)	4	5	3	2
ENL 120	FOUNDATION ENGLISH I	2	4	4	0
UIS 101/ TIS 100	FOUNDATION OF ISLAM I / ISLAMIC CIVILIZATION I (HISTORY)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>27</b>	<b>19</b>	<b>8</b>

GRAND TOTAL

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
BIO 153	CELL BIOLOGY & PHYSIOLOGY II	4	5	3	2
CHM 178	CHEMISTRY	4	5	3	2
MAT 163	INTRODUCTORY MATHEMATICS II	4	4	4	0
PHY 154	PHYSICS (ELECTRICITY I & MECHANICS II)	4	5	3	2
ENL 121	FOUNDATION ENGLISH II	2	4	4	0
UIS 151/ TIS 150	FOUNDATION OF ISLAM II / ISLAMIC CIVILIZATION II (THOUGHTS)	2	2	2	0
KKR ***	CO-CURRICULUM	1	2	0	2
	<b>TOTAL</b>	<b>21</b>	<b>27</b>	<b>19</b>	<b>8</b>

This is the first part of 158 chemistry subjects offered by Diploma in Science. It covers basic concepts of physical chemistry including the mole concept, chemical bonding and gas laws. Inorganic chemistry is introduced through the Periodic table and the chemistry of Group I and Group II elements.

**MAT 113 INTRODUCTORY MATHEMATICS I**

This course covers basic concepts in pure mathematics. It covers basic concepts of algebra, geometry, trigonometry, and calculus. It is designed to provide a solid foundation for the study of mathematics in the diploma program.

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

## YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
BIO 203	PHYSIOLOGY III	4	5	3	2
CHM 228	CHEMISTRY	4	5	3	2
MAT 179	INTRODUCTORY APPLIED MATHEMATICS	3	3	3	0
MAT 215	INTERMEDIATE CALCULUS	2	2	2	0
PHY 204	PHYSICS (MECHANICS III & WAVE THEORY)	4	6	3	3
ENL 230	INTERMEDIATE ENGLISH I	2	4	4	0
UIS 201/	CONTEMPORARY ISLAMIC THINKING /	2	2	2	0
TIS 200	ISLAMIC CIVILIZATION III (ETHICS)				
	<b>TOTAL</b>	<b>21</b>	<b>27</b>	<b>20</b>	<b>7</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
BIO 253	BEHAVIOUR & PHYSIOLOGY IV	4	5	3	2
CHM 278	CHEMISTRY	4	6	3	3
MAT 261	INTERMEDIATE ALGEBRA	2	2	2	0
QMT 213	INTERMEDIATE STATISTICS	2	2	2	0
PHY 254	PHYSICS (MAGNETISM & ELECTRICITY II)	4	6	3	3
ENL 231	INTERMEDIATE ENGLISH II	2	4	4	0
UIS 251/	ISLAMIC HISTORY & CIVILIZATION /	2	2	2	0
TIS 250	ISLAMIC CIVILIZATION IV (JURISPRUDENCE)				
CSC 133	COMPUTERS AND INFORMATION PROCESSING	3	4	2	2
	<b>TOTAL</b>	<b>23</b>	<b>31</b>	<b>21</b>	<b>10</b>

Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial

## YEAR 3

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 5</b>					
BIO 303	ECOLOGY & GENETICS	4	5	3	2
CHM 328	CHEMISTRY	4	6	3	3
MAT 315	ADVANCED CALCULUS	2	2	2	0
QMT 313	ADVANCED STATISTICS	2	2	2	0
PHY 304	PHYSICS (THERMAL & MODERN PHYSICS)	4	6	3	3
UIS 303/ TIS 300	HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I / ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)	2	2	2	0
ETR 300	BASIC ENTREPRENEURSHIP	3	3	3	0
	<b>TOTAL</b>	<b>21</b>	<b>26</b>	<b>18</b>	<b>8</b>
	<b>GRAND TOTAL</b>	<b>107</b>	<b>138</b>	<b>97</b>	<b>41</b>

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

## DESCRIPTION OF SUBJECTS

### YEAR 1 (2½ YEAR COURSE)

#### BIO 103 CELL BIOLOGY & PHYSIOLOGY I

This is an introductory course to cell microstructure and histology of plant and animal cells and tissues. It also includes cell constituents, chemical compositions and their movements. This prepares the students for a better understanding of physiological processes in man which begins with the structure and function of the digestive and respiratory systems for this semester.

#### CHM128 CHEMISTRY

This is the first part of five chemistry subjects offered by Diploma in Science. It covers basic concepts of physical chemistry including the mole concept, chemical bonding and gas laws. Inorganic chemistry is introduced through the Periodic table and the chemistry of Group I and Group II elements.

#### MAT 113 INTRODUCTORY MATHEMATICS I

This code covers a basic course in pure mathematics. It covers basic topics in algebra and geometry such as set theory, numbers, function, permutation, combination, Binomial theorem, Remainder theorem, circular measures, geometry coordinate and polar coordinates.



## PHY 104 PHYSICS (MECHANICS I AND HEAT)

Systems of units, vectors and scalars are introduced. The mechanics section includes forces, Newton's laws of motion, law of gravitation, work and energy, the conservation of momentum and energy, circular motion and simple harmonic motion. The heat section covers topics on heat energy, thermometry, calorimetry, gas laws, kinetic theory of gases and thermal conduction.

### \* ENL 120 FOUNDATION ENGLISH I

### \* UIS 101/ FOUNDATION OF ISLAM I / \* TIS 100 ISLAMIC CIVILIZATION I (HISTORY)

### \* BIO 153 CELL BIOLOGY AND PHYSIOLOGY II

This syllabus covers the basic principles of the physiology of transport, excretion, control of body temperature and homeostasis in animals, especially in mammals; and the principles of cellular respiration and photosynthesis.

### CHM 178 CHEMISTRY

This subject, which is a continuation of CHM 128, covers physical chemistry topics such as chemical equilibrium and acid-base equilibrium; the basics of organic chemistry taught includes hydrocarbon reactions and naming; inorganic chemistry concentrates on Group III and IV elements.

### MAT 163 INTRODUCTORY MATHEMATICS II

This code is a basic course of level two in pure mathematics. The focus is on trigonometry, calculus and conic sections. The topics discussed are trigonometry and the solution of trigonometric equations, differentiation and integration of simple function and its applications, and conic sections such as circle, parabola, ellipse and hyperbola.

### PHY 154 PHYSICS (ELECTRICITY I AND MECHANICS II)

In the electricity section, the topics covered are Coulomb's Law, electric field, electric potential, Gauss's Law, parallel and series circuits, Kirchoff's Laws. The mechanics section deals with fluids in motion, fluids at rest and elasticity.

### \* ENL 121 FOUNDATION ENGLISH II

### \* UIS 151 / FOUNDATION OF ISLAM II / \* TIS 150 ISLAMIC CIVILIZATION II (THOUGHTS)

## YEAR 2

### BIO 203 PHYSIOLOGY III

This syllabus covers uptake, transport and reproduction in plants, cell divisions, nervous and hormonal communication, reception of stimuli and defence against diseases in animals.

### CHM 228 CHEMISTRY

The third part of chemistry covers concepts in physical chemistry relating to solutions and solids. Reactions of aromatic hydrocarbons, alcohols and ethers are given. The general characteristics of Group V and VI are given to add to the inorganic chemistry learned in CHM 128 and CHM 178.

\* Refer to page 12-16

## MAT 179 INTRODUCTORY APPLIED MATHEMATICS

This is a basic course in applied mathematics. The focus is on probability, statistics and mechanics. The topics discussed are probability, tabulation and presentation of data, measures of central tendencies, measures of dispersion, force and motion, vectors, component and resultant forces in equilibrium and kinematic of a particle in a straight line.

## MAT 215 INTERMEDIATE CALCULUS

This covers topics such as power series, summation of series, inverse circular function, hyperbolic function and techniques of integration.

## PHY 204 PHYSICS (MECHANICS III AND WAVE THEORY)

The mechanics section describes static bodies in equilibrium and the rotation of rigid bodies. Properties of waves are introduced, with special emphasis on sound waves and light. Topics of sound wave include vibration of air columns, stretched strings and rods, while refraction and reflection are described for light wave.

### \* ENL 230 INTERMEDIATE ENGLISH I

### \* UIS 201 / CONTEMPORARY ISLAMIC THINKING III /

### \* TIS 200 ISLAMIC CIVILIZATION III (ETHICS)

## BIO 253 BEHAVIOUR AND PHYSIOLOGY IV

This syllabus covers the structure of effectors, types of locomotion, behaviour and reproduction of animals. The syllabus also covers the life cycle of various types of plants and the phenomenon of alternation of generation, the patterns of growth and development, and the control of growth.

## CHM 278 CHEMISTRY

In this fourth part, advanced topics in physical chemistry including phase equilibrium thermochemistry, colloid chemistry and allotropy chemistry are covered. Coverage of organic chemistry includes reactions of carbonyl carboxylic compound, such as aldehydes and ketones, carboxylic acids and amides. Inorganic chemistry concentrates on Group VII and the transition elements.

## MAT 261 INTERMEDIATE ALGEBRA

This code covers intermediate algebra and consists of topics such as complex number, theory of equations, matrices and vectors.

## QMT 213 INTERMEDIATE STATISTICS

This code covers topics such as discrete and continuous random variables, some special random variables such as Binomial, Poisson and Normal distribution and also sampling theory.

## PHY 254 PHYSICS (ELECTRICITY II AND MAGNETISM)

Magnetism deals with magnetic field, magnetic flux, force on current-carrying conductor and moving charge, Hall effect, applications of magnetism in galvanometer and magnetometer, Biot-Savart law, Ampere's law and magnetic materials. Electricity covers topics like a.c., a.c. circuit, semiconductor, diode and transistor.

\* Refer to page 12-16

\* CSC 133 COMPUTERS & INFORMATION PROCESSING

\* ENL 231 INTERMEDIATE ENGLISH II

\* UIS 251 / ISLAMIC HISTORY & CIVILIZATION IV /

\* TIS 250 ISLAMIC CIVILIZATION IV (JURISPRUDENCE)

### YEAR 3

#### BIO 303 ECOLOGY & GENETICS

This syllabus consists of two parts :

The Ecology part covers the basic concepts such as Environment, Energy Relationships, Interrelations between Organisms, Population and Environmental Issues.

In the Genetics section, topics covered are Basic Principles of Genetics such as Mendel's Laws of Heredity, characteristics of genes (dominance, recessive, codominance, multiple, linked and lethal). Other topics in this section are variation, population genetics, abnormalities in man caused by chromosome and the role of nucleic acid in the synthesis of protein.

#### CHM 328 CHEMISTRY

The last part of chemistry covers more advanced topics in physical chemistry including electrochemistry and chemical kinetics. Stereochemistry and conformations of molecules is introduced. Chemistry of carbohydrates and proteins are also covered. Introduction to coordination compounds and infra-red spectroscopy is also given.

#### QMT 313 ADVANCED STATISTICS

This covers the topics of statistics such as estimation theory, hypothesis testing and analysis of variance (one-way classification).

#### MAT 315 ADVANCED CALCULUS

This covers differential equations, limit, continuity and differentiability and convergence and divergence of series.

#### PHY 304 PHYSICS (THERMAL AND MODERN PHYSICS)

The topics of thermal physics include kinetic theory of gases, first and second laws of thermodynamics, heat capacities of gas, isothermal and adiabatic processes, black-body radiation. Modern physics describes photoelectric effect, X-rays, particle wave theory, atomic model, nuclear model, nuclear force, mass-energy equation, binding energy, radioactivity, various radioactive detectors.

\* ETR 300 BASIC ENTREPRENEURSHIP

\* UIS 303 / HISTORY & PHILOSOPHY OF SCIENCE IN ISLAM I /

\* TIS 300 ISLAMIC CIVILIZATION V (ISLAMIC POLITICAL SYSTEM)

\* Refer to page 12-16

## ADVANCED DIPLOMA IN APPLIED CHEMISTRY

### COURSE DESCRIPTION

The course was introduced in July 1992 with the aim of providing trained Bumiputra manpower in applied chemistry and other chemistry - related disciplines. The duration of the course is 2 years for students who already have a diploma in technology. For students who already have a diploma in Science (not technology) they have to attend a Pre-Advanced Diploma course of one semester before they can be admitted into the 2-year programme. A wide range of topics is included in the curriculum so that the students are not only able to learn more technology subjects but also acquire knowledge in production management, human resources management and quality control. Students are also required to do a thesis project.

### CAREER PROSPECTS

The graduates of Advanced Diploma in Applied Chemistry can be employed as process engineers, application engineers, waste water treatment consultant engineers, quality control managers and researchers in various industries such as food, plastic, electronic and steel industries, consultant engineering firms, government departments and research institutions.

### OPPORTUNITIES FOR FURTHER STUDIES

In August 1994, the Advanced Diploma in Applied Chemistry was officially recognised by Jabatan Perkhidmatan Awam (JPA) as equivalent to the degree of B.Sc. (Hons.) awarded by the local universities. Hence, the graduates of this course can pursue further their studies to obtain a Master of Science or Ph.D. degree locally or overseas.

### FACILITIES AVAILABLE

In order to facilitate and complement the teaching and learning processes several laboratories has been set up. There are two instrumental laboratories which are fully equipped with modern instruments such as Atomic Absorption Spectrometer, Inductively - Coupled Plasma Atomic Emission Spectrometer, Capillary Electrophoresis, Infrared Spectrometer, Nuclear Magnetic Resonance Spectrometer, Gas and Liquid Chromatograph and Ultraviolet Visible Spectrometer.

The laboratories for industrial process, unit operation and polymer chemistry are also located within the School of Applied Sciences.

**COURSE TUTOR:** Lee Kok Kheng

### ACADEMIC STAFF

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturers</b>			
1.	Abdul Halim b. Mohd Hashim	M. Sc. (Ohio U.) B.Sc. (U.M.)	Physical Chemistry Physical Chemistry
2.	Goh Teik Poh	Ph. D. (U.M.) M.Sc. (U.M.) B.Sc. Hons. (U. Adelaide)	Organic Chemistry Organic Chemistry Organic Chemistry
3.	Ku Halim b. Ku Hamid	M.Sc. Eng. (U.K.M.) B.Sc. Hons. (U.K.M.)	Mechanical Engineering Chemical Technology

No.	Name	Qualification	Area of Specialization
4.	Lee Kok Kheng	M.Sc. (U.M.) B.Sc. (Hons), U.M. Dip. Ed. (U.M.)	Environmental Management Chemistry Education
5.	Mohd. Rosli b. Sulaiman	M. Sc. (U. Newcastle Upon Tyne) B.Sc. (U. Newcastle Upon Tyne)	Chemical Engineering Chemical Engineering
6.	Nor'ashikin Saim	M.Sc. (Knox College) B.Sc. (Kansas U.)	Chemistry Chemistry
7.	Norsaadah bt. Hj. Ismail	Ph. D. (N. Illinois U.) B.Sc. (U. Loughborough)	Physical Organic Chemistry Physical Organic Chemistry
8.	Stephen Lee Koon Liang	M. Eng. (U. Florida) B. Sc. Hons (U.M.) Dip. Ed. (U.M.)	Chemical Engineering Kimia
9.	Wan Shabuddin Wan Ali	M.Sc. (Marshall U.) B. Sc. Eng. (U. Tennessee)	Chemical Engineering Physical Organic Chemistry

#### Lecturers

1.	Abdul Aziz b. Ishak	M.Sc. Eng. (U. Washington) B.Sc. Eng. (Wayne State U.)	Chemical Engineering Chemical Engineering
2.	Famiza bt. Abdul Latif	B.Sc. Hons (U.K.M.)	Chemistry
3.	Haliza bt. Kassim B.Sc. (Western Illinois U.)	M.Sc. (Western Illinois U.)	Analytical Chemistry
4.	Norazah bt. Abdul Rahman	B. Engr. Hons. (U. Missouri-Rolla)	Chemical Engineering
5.	Nurhuda bt. Hj. Ismail	B. Engr. Hons. (U.T.M.)	Chemical Engineering
6.	Ruzitah bt. Mohd Salleh	M.Sc. Eng. (U. Washington) B.Engr. Hons. (U. Strathclyde)	Chemical Engineering
7.	Hj. Safaruddin b. Hj. Kamarudin	B.Sc. Hons (U. Teesside) Postgrad Dip. Env. Tech & Mgmt. (Asian Inst. of Tech.)	Environmental Engineering
8.	Sharifah Aishah bt. Syed A. Kadir	B.Sc. Hons. (U. Salford)	Chemical Engineering
9.	Zainuddin b. Hashim	M.Sc. (U. Kent) B.Sc. (U.S.M.)	Chemistry
10.	Zarila bt. Mohd. Shariff	M.Sc. (California State U.) B.Sc. (California State U.)	Chemistry

**CURRICULUM**  
**PRE-ADVANCED DIPLOMA**

YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 00</b>					
CMT401	MATERIAL SCIENCE	2	2	2	0
CMT403	INDUSTRIAL PROCESS	4	4	3	2
CMT407	UNIT OPERATION	4	6	3	3
CMT408	INTRODUCTION TO THERMODYNAMICS	3	3	3	0
CMT410	ANALYTICAL SCIENCE	5	6	3	3
	<b>TOTAL</b>	<b>18</b>	<b>21</b>	<b>14</b>	<b>8</b>

**2-YEAR COURSE**

**YEAR 1**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
CMT501	NON DESTRUCTIVE TESTING	4	6	3	3
CSC502	COMPUTER APPLICATIONS	4	4	2	2
CMT503	POLYMER CHEMISTRY AND TECHNOLOGY	3	5	2	3
CMT510	SEPARATION METHODS	4	6	3	3
MAT519	APPLIED MATHEMATICS	4	4	4	0
	<b>TOTAL</b>	<b>19</b>	<b>25</b>	<b>14</b>	<b>11</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
CMT551	ELECTROCHEMICAL AND CORROSION SCIENCE	4	6	3	3
CMT563	PROCESS MEASUREMENT AND MONITORING	4	6	3	3
CMT577	CHEMICAL TECHNOLOGY	4	6	3	3
CMT580	SPECTROSCOPIC TECHNIQUES	4	6	3	3
EEN524	ELECTRONICS FOR CHEMISTS	4	6	3	3
	<b>TOTAL</b>	<b>20</b>	<b>30</b>	<b>15</b>	<b>15</b>

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

## YEAR 2

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
CMT601	COLLOID AND SURFACE CHEMISTRY	4	4	3	3
CMT603	PRINCIPLES OF BIOTECHNOLOGY	4	6	3	3
FST605	FOOD CHEMISTRY	3	5	2	3
MGT556	PRODUCTION MANAGEMENT	3	3	3	0
MKT501	MARKETING PRINCIPLES AND PRACTICE	3	3	3	0
CMT619	THESIS 1	3	6	0	6
	<b>TOTAL</b>	<b>20</b>	<b>27</b>	<b>14</b>	<b>15</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
CMT 651	QUALITY CONTROL AND ASSURANCE	3	3	3	0
CMT653	PROCESS CONTROL INSTRUMENTATION AND SAFETY	3	3	3	0
CMT658	ENERGY TECHNOLOGY	3	3	3	0
CMT666	SPECIAL TOPICS IN CHEMICAL TECHNOLOGY	3	3	3	0
HRM530	INTRODUCTION TO HUMAN RESOURCE MANAGEMENT	3	3	3	0
CMT679	THESIS II	3	6	0	6
CMT685	INDUSTRIAL TRAINING	4	4	0	0
	<b>TOTAL</b>	<b>22</b>	<b>25</b>	<b>15</b>	<b>6</b>
	<b>GRAND TOTAL</b>	<b>81</b>	<b>107</b>	<b>58</b>	<b>47</b>

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

### DESCRIPTION OF SUBJECTS

#### PRE-ADVANCED DIPLOMA

#### CMT 401 MATERIAL SCIENCE

This introductory course presents the structures of solids, solid solutions, phase rule, ferrous alloys, non-ferrous alloys and the basics of corrosion engineering.

## **CMT 403 INDUSTRIAL PROCESSES**

This is an introduction to Malaysia's major chemical industries. Basic flow chart reading, understanding equipment symbols and waste management are taught. The chemical processes studied are petroleum industries, palm oil processing, polymer and cement industries.

## **CMT 407 UNIT OPERATION**

Introduction to chemical engineering. General concept of material balance. The fundamental aspects of physical separation processes such as distillation, extraction and drying.

## **CMT 408 INTRODUCTION TO THERMODYNAMICS**

This subject includes the following topics; an introduction to thermodynamics, units and the conversion of units, dimensional analysis and its application in closed and open systems, second law of thermodynamics, heat engine and reversed heat engine, entropy, Carrot and Rankine cycles.

## **CMT 410 ANALYTICAL CHEMISTRY**

The course covers the basic knowledge and application of redox titration, potentiometric titration, precipitation titration, complex titration and conductometric titration. It also deals with separation chromatography and its basic applications. Introduction to the theory and application of instruments used in chemical analysis such as gas chromatography, High Performance Liquid Chromatography (HPLC), emission spectrometry, atomic absorption spectrometry, ultraviolet spectrometry and infrared spectroscopy.

## **YEAR 1**

### **CMT 501 NON DESTRUCTIVE TESTING**

This course covers the basic knowledge in non destructive techniques including practicals. The syllabus includes radiography (X-ray and gamma ray), ultrasonic, liquid penetrant, magnetic particle and eddy current.

### **CSC 502 COMPUTER APPLICATIONS**

The course is aimed at giving the student a wide knowledge on database management systems encountered in designing and using a database system. The primary emphasis is on entity-relationship model, followed by an in-depth coverage of the relational model including query processing.

### **CMT 503 POLYMER CHEMISTRY AND TECHNOLOGY**

This is an introductory course in basic polymer chemistry and technology. The basic polymer chemistry syllabus covers the concept of macromolecule, polymer solution, polymer instrumental analysis, structure and properties of bulk polymer, various polymerization and copolymerisation processes, structure and properties of commercial polymers. The polymer technology syllabus covers the basic principles of plastics and rubber processing such as plastic fabrications, fiber technology and elastomer technology.

### **CMT 510 SEPARATION METHODS**

This course covers modern and new concepts in the application and development of gas chromatography, high performance liquid chromatography, supercritical fluid chromatography and electrophoresis.

### **MAT 519 APPLIED MATHEMATICS FOR CHEMISTS**

This subject covers important topics required in engineering and science disciplines. The topics include linear algebra, vector calculus, multiple integral, analytic complex functions, Fourier series, Laplace Transform, ordinary and partial differential equations.



## **CMT 551 ELECTROCHEMICAL AND CORROSION SCIENCE**

The course is aimed at giving the student a wide overall spectrum on the industrial aspects of corrosion science, including corrosion behaviour and corrosion protection.

## **CMT 563 PROCESS MEASUREMENT AND MONITORING**

The course deals with the physical, chemical and microbiological measurements of the quality of potable and wastewater. Emphasis is placed on various chemical and biological treatment technologies and the application of the parameters measured in the design and control of the treatment processes.

## **CMT 577 CHEMICAL TECHNOLOGY**

The course covers the basic knowledge needed in understanding the principles of unit operations in fluid flow and heat transfer. Reactor design, fundamentals of stirred tank and tubular flow reactions, homogenous and heterogenous reactions are also included.

## **CMT 580 SPECTROSCOPIC TECHNIQUES**

The course covers the theoretical principles and instrumentation in chemical analysis and structure elucidation based on absorption, emission, diffraction and mass spectrometry. It also covers the interpretation of atomic, molecular, nuclear and mass spectra. Techniques in emission spectroscopy, IR, UV, X-ray analysis, NMR, ESR and mass spectroscopy are also included.

## **EEN 524 ELECTRONICS FOR CHEMISTS**

The syllabus covers topics such as semiconductors, power supplies and regulators, multimeters, oscillators, transducers and signal processing and data-logging.

## **YEAR 2**

### **CMT 601 COLLOID AND SURFACE CHEMISTRY**

The course covers the basic concepts of colloid and surface chemistry. Topics such as characterization of colloid dispersions, stability of colloidal dispersions, preparation of colloidal dispersions and association colloids are introduced. Emphasis is on the qualitative aspects of colloid science.

### **CMT 603 PRINCIPLES OF BIOTECHNOLOGY**

This subject involves the fundamental principles and applications of biotechnology. It covers microbial growth and culturing micro-organisms for production, plant and animal cell culture, enzyme technology, genetic engineering, bioreactors and product recovery.

### **FST 605 FOOD CHEMISTRY**

The course teaches the study of food commodities from a chemical standpoint. The primary emphasis is on their composition and the changes that occur during processing, distribution, and storage. The food commodities covered include oils and fats, meat, poultry and fish, egg, milk, cereals and flour, fruit and vegetables. Browning reactions and the chemistry of basic macromolecules are also covered.

### **MGT 556 PRODUCTION MANAGEMENT**

The course is designed to provide students with the knowledge required during the initial, on-line and control stages of production. It covers process design, location and layout, production and workforce planning, quality assurance and control, inventory control, work study and maintenance.

## MKT 501 MARKETING: PRINCIPLES AND PRACTICE

The course introduces the principles and practices of marketing. It includes market segmentation, targeting, positioning and the marketing mix. It also covers the areas of consumer behavior, marketing research and marketing environment.

## CMT 619 THESIS 1

Thesis topics will be chosen from a wide field of chemistry and related disciplines. Each thesis will be under close supervision of one or more members of staff. The thesis together with an oral presentation will be assessed and graded.

## CMT 651 QUALITY CONTROL AND ASSURANCE

This course covers both control and quality assurance. Topics covered will be quality cost, quality circles, statistical tools for quality control, company wide planning for quality and introduction to quality manual.

## CMT 653 PROCESS CONTROL INSTRUMENTATION AND SAFETY

The subject covers the introduction to the process control instrumentation measurement of pressure, temperature, level and composition. Topics on safety include toxicology, hazards, risk assessments and chemical safety procedures.

## CMT 658 ENERGY TECHNOLOGY

This subject covers a wide area of the past and present forms of energy technology. Energy fundamentals in terms of physical concepts, followed by the conventional energy sources of today as well as alternative systems in the form of renewable sources are covered. It also includes the treatment of energy generation and transmission as well as the economic considerations.

## CMT 666 SPECIAL TOPICS IN CHEMICAL TECHNOLOGY

In this course, experts are invited to present and discuss current developments in chemical technology. Students are also required to submit a written report and an oral presentation on related topics. HRM 530

## INTRODUCTION TO HUMAN RESOURCE MANAGEMENT

Human Resource Management encompasses a comprehensive set of functions such as human resource planning, job analysis, recruitment training, designing performance appraisal and compensation system and labour relations. All these are necessary for developing motivated, effective and efficient staff towards the attainment of strategic organizational objectives.

## CMT 679 THESIS II 3

A continuation of CMT 619 (THESIS I).

## CMT 685 INDUSTRIAL TRAINING

Students are attached to chemical-based industries or relevant government agencies for a duration of 6 to 8 weeks. At the end of the training period, the students are assessed on their written reports and oral presentation.

# ADVANCED DIPLOMA IN FURNITURE TECHNOLOGY

## COURSE DESCRIPTION

This course concentrates on a systematic approach to furniture manufacturing , computer usage for CAD/CAE/CAM and CIM, management technology in addition to process management, management of raw materials and assets, as well as human resource management, marketing technique for furniture and furniture components, as well as product quality by various testing techniques (finishing and performance) and Engineering Design Analysis of furniture.

Advanced Diploma in Furniture Technology involves learning through lectures and practicals. Students are required to undergo Industrial Training at various furniture based industries in their final semester.

## CAREER PROSPECTS

Graduates with Advanced Diploma in Furniture Technology have a wide range of job and career opportunities. They may proceed to :-

### A. The Private Sector :

#### Furniture Manufacturing

- i. Furniture design
- ii. Furniture machining
- iii. Furniture Finishing
- iv. Furniture Engineering
- v. Marketing
- vi. Administration

Graduates from this course can enter the employment market as :-

- i. Managers
- ii. Assistant Managers
- iii. Manufacturing/Marketing Executive
- iv. Manufacturing Superintendants
- v. Manufacturing Supervisors
- vi. Masters of Machining

### B. The Government Sector :

- i. Government officers
- ii. Lecturers, tutors, teachers and demonstrators
- iii. Officers at various statutory bodies, such as FRIM, MTC, MTIB, STDIC and in the Customs Department.

### C. Business ventures into Furniture manufacturing .

## ADMISSION REQUIREMENTS

- i. Candidates must have achieved at least A Diploma from Institut Teknologi MARA or any other accredited Institution of Higher Learning.
- ii. Graduates from the following courses are given priority :-
  - a. Wood Technology
  - b. Forestry
  - c. Rubber and Plastic Technology

- d. Textile Technology
- e. Civil Engineering
- f. Mechanical Engineering
- g. Manufacturing Technology
- h. Industrial Technology
- i. Business Administration
- j. Marketing and Accounting
- k. Science and Technology.

- iii. Credit Transfer will be considered where suitable.
- iv. Interviews will be carried out where necessary.

### OPORTUNITIES FOR FURTHER STUDIES

Graduates of this course can further their studies at Masters and Ph. D levels locally or abroad in various areas such as Furniture Technology, Manufacturing Technology, Industrial Technology, Furniture Marketing, Administration, and related areas.

### FACILITIES AVAILABLE

Well equipped laboratories and workshops are available for analysis of the properties of furniture materials, computer aided methods , furniture making, furniture design, furniture testing and other related furniture manufacturing techniques . Computers for CAD/CAE/CAM are available at CADEM Centre.

**COURSE TUTOR:** Dr. Suhaimi Muhammed

### ACADEMIC STAFF

No.	Name	Qualification	Area of Specialization
<b>Senior Lecturers</b>			
1.	Abd. Jalil Ahmad	M. Sc. (State U. New York) B.Sc. For. (Australian National U.)	Wood Product Engineering
2.	Ashari Abd. Jalil	B.Sc. For (U. Auckland) M.W.P.S. (North Carolina State U.)	Wood Products
3.	Jamaludin Kasim	M. For (U. Philippines Los Banos) Dip. Wood Tech. (I.T.M)	Wood Chemistry
4.	Kasani Yusuf	M. Sc. (U. Wales) B.Sc. For. (U.P.M) Dip. For. (I.T.M)	Furniture Marketing
<b>Lecturers</b>			
1.	Chen Fung Woo	M. Ag. (U. Ghent) B. Sc. Hons. (U.M)	Particleboard
2.	Mansur Ahmad	M. Sc. For. & Wood Sc. (Colorado State U.) B.Sc. Wood Tech. (U. Maine) Dip. Wood Tech. (I.T.M)	Timber structure

No.	Name	Qualification	Area of Specialization
3.	Mohd. Nazip Suratman	M.Sc. For. (U. Nebraska) B.Sc. For. Hons. (U.P.M)	Forest Management
4.	Shaikh Abd. Karim Yamani	M. Phil. Wood Sc. (U. Wales) B. Sc. Hons. Wood Sc(U. Wales) Dip. Wood Tech. (I.T.M)	Wood Composite
5.	Dr. Suhaimi Muhammed	Ph. D. (U. Aberdeen)  M. Sc. Wood Sc. & Tech. (U. Philippines Los Banos) Dip. Wood Tech. (I.T.M)	Wood Anatomy

## CURRICULUM 2 - YEAR COURSE

### YEAR 1

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 1</b>					
FUR 426	WOOD-BASED INDUSTRIES	4.0	6.0	3.0	3.0
FUR 401	FURNITURE MATERIAL PROPERTIES	4.0	5.0	3.0	2.0
FUR 470	HARDWARE & JOINTING SYSTEMS	2.0	2.0	2.0	0.0
FUR 430	INTRODUCTION TO CAD/CAE/CAM	3.0	7.0	1.0	6.0
FUR 436	FUNDAMENTALS OF STATISTICS	3.0	3.0	3.0	0.0
	ELECTIVE I	3.0	5.0	2.0	3.0
	<b>TOTAL</b>	<b>19.0</b>	<b>28.0</b>	<b>14.0</b>	<b>14.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 2</b>					
FUR 473	FURNITURE MACHINING	4.0	6.0	3.0	3.0
FUR 474	FURNITURE FINISHING	3.0	5.0	2.0	3.0
FUR 416	FURNITURE MARKETING	3.0	3.0	3.0	0.0
FUR 467	HUMAN RESOURCE MANAGEMENT	3.0	3.0	3.0	0.0
FUR 488	QUALITY ASSURANCE	3.0	4.0	2.0	2.0
	ELECTIVE II	3.0	5.0	2.0	3.0
	<b>TOTAL</b>	<b>19.0</b>	<b>26.0</b>	<b>15.0</b>	<b>11.0</b>

Notes : Lect - Lecture, Lab/Tut. - Laboratory work and/or Tutorial

**YEAR 2**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 3</b>					
FUR 524	FURNITURE MANUFACTURING	4.0	6.0	3.0	3.0
FUR 535	FURNITURE TESTING	3.0	4.0	2.0	2.0
FUR 518	PRODUCTION & OPERATION MANAGEMENT	3.0	3.0	3.0	0.0
FUR 517	MANAGERIAL ACCOUNTING	3.0	3.0	3.0	0.0
FUR 549	RESEARCH METHODS & SEMINAR	2.0	4.0	1.0	3.0
	ELECTIVE III	3.0	5.0	2.0	3.0
	<b>TOTAL</b>	<b>18.0</b>	<b>25.0</b>	<b>14.0</b>	<b>11.0</b>

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
<b>Part 4</b>					
FUR 590	INDUSTRIAL TRAINING	12.0		6 month	
	<b>TOTAL 12.0</b>	<b>36.0</b>	<b>0.0</b>	<b>36.0</b>	

**ELECTIVE SUBJECTS**

Code	Subject	Hours per week			
		Credit Hour	Contact Hour	Lect.	Lab./Tut.
FUR 556	FURNITURE DESIGNS	3.0	5.0	2.0	3.0
FUR 557	UPHOLSTERY & COATING	3.0	5.0	2.0	3.0
FUR 586	FURNITURE ENGINEERING	3.0	5.0	2.0	3.0
FUR 587	STRENGTH DESIGN OF FURNITURE	3.0	5.0	2.0	3.0
FUR 576	HI-TECH WOOD MACHINING	3.0	7.0	1.0	6.0
	<b>GRAND TOTAL</b>	<b>68.0</b>	<b>115.0</b>	<b>43.0</b>	<b>72.0</b>

**Notes: Lect - Lecture, Lab./Tut. - Laboratory Work and/or Tutorial**

## DESCRIPTIONS OF SUBJECT

### YEAR 1

#### FUR 426 WOOD-BASED INDUSTRIES

This course introduces students to the world of furniture. It comprises an overview of furniture industries, its importance, contribution to the national economy, and history of furniture. In addition, classification of furniture, furniture parts and its specific attribution will be taught. The second part of this subject consists of an introduction to primary wood processing such as sawmilling, plywood manufacturing, particleboard making, medium density fiberboard (MDF) manufacturing and conventional secondary wood processing such as conventional operation, mouldings, joineries and others.

#### FUR 401 FURNITURE MATERIAL PROPERTIES

This course will discuss about wood as an engineering material. It will cover the physical and strength properties of woody material including rattan and bamboo. In addition, students will be introduced to the physical and mechanical properties of products such as wood panels, metals, plastic, advanced materials and others. Students will also study the effect of heat conduction, chemical reaction and other environmental factors which influence mechanical strength.

#### FUR 470 HARDWARE AND JOINTING SYSTEMS

This course covers the purpose and usage of various furniture hardware and its jointing system. It covers dowels, nails, screws, hinges, flaps, rollers, cylinders, springs, treaded and inserted metal, levelers, caps, slides, holders, magnetics, etc. The use, durability, properties and proper location for the above hardware and the types of flooring and functions of coatings will also be covered.

This course will also introduce the technology of infra-reds, pneumatic cylinders, electricity, audio wiring etc.

#### FUR 430 INTRODUCTION TO CAD/CAE/CAM

This subject prepares students to use the computer heavily for designing (CAD), engineering analysis (CAE) and integrated manufacturing (CIM). Computer usage relevant to the Malaysian industrial environment i.e. personal computer or workstation. The student will be familiarized with both DOS and UNIX environment. The software used for designing are AutoCAD, VersaCAD, and IDEAS. IDEAS and Ansys will be used for engineering analysis. IDEAS and related software will be used for CIM purposes.

#### FUR 436 FUNDAMENTALS OF STATISTICS

This course teaches the fundamentals of statistical concepts and methods along with practical advice on their effective application to real-world problems. It contains data acquisition, classification and distribution patterns, charts, measures, probability, variables, sampling, population, regressions, and variances.

#### FUR 473 FURNITURE MACHINING

This course teaches all common conventional wood working machinery for operation such as ripping, cross-cutting, planing, routing, drilling, turning, sanding, clamping, shaping etc., making jigs and fixtures, tools in woodworking e.g. saw, knife, drill bit etc., safety regulations, plant layout, machine arrangements, space, material handling and safety aspects.

The laboratory work is designed for students to have a hands-on experience in machining and understanding hardware, their usage and the environment.

## **FUR 474 FURNITURE FINISHING**

This course covers varieties of furniture finishing, surface preparations, finishing materials such as plastic coating, paper coating, aluminum coating, liquid-based finishes, methods of application, drying, refinishing, care of furniture, polishing, rubbing, and maintenance of furniture. In addition, lamination finishes such as melamine, phenolic or urea based laminated papers will be taught. The technology of edge bending, edge and corner protection will also be taught. It also introduces various methods of testing finishes, quality e.g. film thickness, hardness, chemical reaction, abrasion etc.

## **FUR 416 FURNITURE MARKETING**

This course will cover the market environment for all types of furniture such as upholstered furniture, case goods, domestic and office furniture. It also covers product development, marketing research, information systems, consumer market, pricing, personal selling, advertising, sales promotion, sale by retail or wholesale, physical distribution, inventory management, international market, contracts and distribution channels.

## **FUR 467 HUMAN RESOURCE MANAGEMENT**

This subject provides an introduction to the managerial function of human resource management with emphasis on the skills and techniques needed by the manager to make the most efficient and effective use of staff in his organization.

## **FUR 488 QUALITY ASSURANCE**

This subject examines approaches for planning the quality control functions of a system and analyzes problems of quality control. The course includes topics such as the function of quality control in each stage in the development of a product, the economics of quality control and the data systems and diagnostic techniques that are used for quality improvement, as well as statistical and acceptance sampling, and vendor-customer relations.

## **YEAR 2**

## **FUR 524 FURNITURE MANUFACTURING**

This course is designed to expose the students systematically to the process of furniture manufacturing. It discusses the proper use of raw materials such as solid wood, wood-based panels, plastics, tabular steel or aluminum, leather etc. The optimized aspects of cutting and arranging the raw materials will be taught. The purpose of bill of materials, veneer bill, route sheet, hardware list and finishing bills will be discussed. The importance of jigs and fixtures in the furniture and joinery industries will also be discussed. The uses and special attributes of all machines in the furniture industries will be discussed briefly. Other manufacturing processes such as reading a design, time study, economic aspects and factory management will be included.

## **FUR 535 FURNITURE TESTING**

This course is to teach the strength design of a particular furniture such as in frame and frameless furniture. It will cover types of loads, transfer moment, types of joints and connectors, species strength and sizes of furniture parts. In addition, it will include types of furniture testing such as deflections, creeps, performance testing, hardware and connectors test.

## **FUR 518 PRODUCTION AND OPERATION MANAGEMENT**

Production and operation management is a subject that involves a blend of management concepts, statistics, computing, accounting, finance and industrial engineering. This course is relevant to both manufacturing and nonmanufacturing oriented organizations.



## **FUR 517 MANAGERIAL ACCOUNTING**

This course relates to the internal operation of a company such as servicing, merchandising and manufacturing. The topics discussed include management accounting which focusses on nonfinancial data analysis, product costing, budgeting as a control function and accounting as a strong element for decision support analysis.

## **FUR 549 RESEARCH METHODS AND SEMINAR**

In this course, students will be taught how to prepare and write a standard project proposal, a thesis and a working paper. The proper methods will be taught for writing an abstract, literature search, developing a research method, analyzing data, developing hypothesis, discussion, conclusion and recommendation. In addition, students are required to write and present a professional talk in selected topics of their research work. Representatives from the furniture industries and organizations will be invited to give talks in relevant topics.

The papers presented at the seminar will be compiled into a Furniture Technology Seminar Proceedings.

## **FUR 590 INDUSTRIAL TRAINING**

Industrial training is a must for every student. The training is carried out either in the private sector or in government agencies. The duration of the training is 5 months.

## **ELECTIVE SUBJECTS**

### **FUR 556 FURNITURE DESIGNS**

This course teaches the normal activities of people when using and interacting with furniture. It also teaches the ergonomics and anthropometrics of human beings. The use of computer aided design and drafting will be emphasized.

The laboratory work is designed to let the students learn and practise some of the software available for the computer aided design.

### **FUR 557 UPHOLSTERY AND COATING**

The physical and mechanical properties of various fabrics used in upholstered furniture finishing is taught in this course. The criteria for choosing fabric materials e.g. natural, protein and synthetic fiber for a specific purpose is taught. The technique of fabric cutting, sewing, stapling and tacking are also included. In addition the use of cushion materials e.g. foam and husk, the study of fashion trend, color and pattern are also elaborated.

The art of decorative finishing is also taught in this course. This includes French polishing, scorching, rubbing, waxing, oiling, denting, eye-speck, decoupage etc. The student will learn about finishing materials, application methods and restoring old furniture.

### **FUR 586 FURNITURE ENGINEERING**

This course has three main sections i.e. engineering drawing practice which includes technical drawing, mechanical drawing and blue print; the second part is ergonomics engineering which includes temperature, sound, lighting, vibration, and space. The last part is on the fundamental of structural analysis.

## 587 STRENGTH DESIGN OF FURNITURE

This course is concerned with the strength of furniture. A methodology is developed which permits a designer to analyze the strength requirements of a specific piece of furniture and then calculate on a scientific basis, the size of the members and the joints needed to satisfy these requirements.

## FUR 576 HI-TECH WOOD MACHINING

This course introduces the modern wood machining technique such as the computer numerical control machines, automatic copying machines and robotics machines. In addition, the student will also study the feed and speed, power consumption in relation to the volume to be cut, time and motion study, and other factors affecting the machining capacity.

## 10. GLOSSARY OF ACADEMIC TERMINOLOGY

**ACADEMIC ADVISER:** A member of a Panel of Academic Advisers who advises the School of Applied Sciences on the contents of the curriculum and ensures that they are in line with current industrial development and needs.

**ACADEMIC CALENDER:** The period that makes up the school year, divided into two semesters.

**ACADEMIC YEAR :** The period of academic instruction, usually extending from July to November and January to May i.e. it is divided into two semesters.

**ACADEMIC PROBATION:** As a result of poor grades, students are issued a warning that states they are in danger of dismissal at a future date, unless there is an improvement in their academic performance.

**CAMPUS:** The land on which the buildings of the Institute are located.

**CORE CURRICULUM:** A group of required subjects designed by a course as requirements for a specific diploma programme.

**COURSE LOAD:** The number of subjects taken in a given semester. Typically, students take four or five courses each term.

**COURSE TUTOR:** The head of department of a particular diploma or advanced diploma course.

**CREDITS:** Each course is worth a specific number of credits which students receive only if the course is passed.

**CUMULATIVE GRADE POINT AVERAGE:** This refers to a student's cumulative grade point average.

**DEAN:** The highest authority within the School of Applied Sciences.

**DEAN'S LIST:** A list, determined each semester, of those students in the School who have achieved a high grade point average.

**DIRECTOR'S LIST:** A list of students of the Institut who complete their course with excellence and are conferred an award of excellence by the director.

**FINAL EXAMINATION:** A course-based examination given at the end of the semester in each course.

**GRADE:** An evaluation (normally by a letter of the alphabet rather than by numeral) of a student's performance on an examination or paper.

**GRADE POINT AVERAGE:** A system of recording academic achievement based on an average, calculated by multiplying the numerical grade received in each course/subject by the number of credit hours studied.

**LOAD:** An informal term used by lecturers or students to refer to the number of credits (or courses) they are teaching or studying respectively.

**PROBATION:** A trial period for students not making satisfactory academic progress.

**SEMESTER:** One academic term which is half of an academic year.

**SUBJECTS:** Courses in an academic discipline offered as part of a curriculum of the School or Institute.

**SYLLABUS:** An outline of topics to be covered in an academic course.

**TRANSCRIPT:** Official record kept by the School or Institute of a student's grades, courses.

**TRANSFER CREDIT:** Credit awarded towards a diploma or advanced diploma on the basis of studies at another institution.

