USM
UNIVERSITI SAINS MALAYSIA

APEX™

ENV TECH

Bachelor of Technology (Honours)
ENVIRONMENT
ACADEMIC HANDBOOK

Pollution

Legislation

Treatment

Prevention

Monitoring

Sustainable

School of Industrial Technology
Universiti Sains Malaysia
www.indtech.usm.my

2020/2021

Academic Handbook
Bachelor of Technology (Honours) (Environment)
Academic Calendar of 2020/2021

A full version of the Academic Handbook can be access from USM Division of Academic & International website (http://baa.usm.my) or via the QR code provided. The Academic Handbook is for staff and student in USM only. A valid USM Campus Online username and password are required to access the Academic Handbook.

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Full version of the Academic Handbook

Vision and Mission
Universiti Sains Malaysia

Vision
Transforming Higher Education for a Sustainable Tomorrow

Mission
USM is a pioneering, transdisciplinary research intensive university that empowers future talents and enables the bottom billions to transform their socio-economic well-being

Vision and Mission
School of Industrial Technology

Vision
World class centre in technological innovation for a sustainable tomorrow

Mission

1. To be the prime education provider of technologists who are competent, capable of independent thinking, possess communication and analytical skills, and able to fulfil the needs in various industries and socio- economic development.

2. To pursue cutting-edge research in the fields of Food Technology, Bioresource Technology, Environmental Technology, and Bioprocess Technology.

3. To contribute to the well-being of the community through sustainability-led dynamic transdisciplinary academic programmes, research innovation, teamwork, and continuous improvement.

"The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn."

–Alvin Toffler–

History
School of Industrial Technology

1973
The School of Industrial Technology commenced with the establishment of the School of Applied Sciences. The School offered the Bachelor of Applied Science programmes in Electronic Science and Technology, Food Science and Technology, and Polymer Science and Technology.

1984
The name of the School was changed to the School of Engineering Sciences and Industrial Technology. Hence, the curricula were amended to Bachelor of Engineering (B. Eng) and Bachelor of Technology (B. Tech) to meet the requirement of engineering and industrial technology courses.

1986
The School was split into :
- School of Electrical and Electronic Engineering
- School of Materials and Mineral Resources Engineering
- School of Industrial Technology

School of Industrial Technology offered Bachelor of Technology programmes in Food Technology, Polymer Science and Technology, Quality Control & Instrumentation, and Wood, Paper and Coatings Technology.

2001
Polymer Technology and Quality Control & Instrumentation programmes were upgraded into:
- Polymer Engineering programme
- Mechatronic Engineering programme

1999
Environmental Technology programme was introduced by School of Industrial Technology.

2002
Wood, Paper and Coatings Technology programme was renamed Bioresource, Paper and Coatings Technology programme.

2008
Bioprocess Technology programme was introduced by School of Industrial Technology.

2018
Master of Science (Environmental Science) programme was introduced by School of Industrial Technology.

2020
Bioresource, Paper and Coatings Technology programme was renamed Bioresource Technology programme.

Administrative Staff

1	Dean	Prof. Dr. Norli Ismail
2	Deputy Dean (Research, Innovation & Industrial - Community Engagement)	Assoc. Prof. Dr. Mohamad Haafiz Mohamad Kassim
3	Deputy Dean (Academic, Career & International)	Assoc. Prof. Dr. Yusri Yusup
4	Programme Chairman (Food Technology)	Prof. Dr. Fazilah Ariffin
5	Programme Chairman (Environmental Technology)	Assoc. Prof. Dr. Mardiana Idayu Ahmad
6	Programme Chairman (Bioresource Technology)	Assoc. Prof. Dr. Leh Cheu Peng
7	Programme Chairman (Bioprocess Technology)	Dr. Lee Chee Keong
8	Senior Assistant Registrar (Academic & Administration)	Mdm. Rasslene Rass Rasalingam
9	Senior Assistant Registrar (Postgraduate & Human Resource)	Mr. Mohd Faisal Abu Bakar
10	Senior Research Officer	Mr. Che Ku Abdullah Che Ku Alam
11	Senior Science Officer	Mr. Jeffiz Ezuer Shafii
12	Science Officer	Mr. Mohd Syukri Baharudin

Programme Outcomes

At the end of the programme, students will be able to:

1. Acquire the knowledge and skills in the area of technology specialised (Knowledge)
2. Exhibit extensive technical skills in the area of specialisation (Technical Skill, Practical Skill, Psychomotor)
3. Identify and resolve issues and problems in a critical, creative, and innovative manner (Thinking Skill and Scientific Approach)
4. Acquire the skill to communicate effectively in all walks of life (Communication Skill)
5. Display a sense of responsibility and master social skills (Social and Responsibility Skill)
6. Understand and manage the industry in a professional and ethical manner (Professionalism, Value, Attitude and Ethics)
7. Manage current information and recognise the importance of lifelong learning (Lifelong Education and Information Management)
8. Acquire entrepreneurial knowledge base for career development (Management and Entrepreneurship Skill)
9. Function effectively as an individual and in a team with the ability to lead (Leadership Skill)

Mentor-Mentee System & Counselling Service

The mentors are appointed among the academic staff of the School who provide assistance and guidance to students mainly in the academic matters. However, the School has established an open mentor system whereby probation students are free to see any of the mentors. Nevertheless, probation students are recommended to discuss academic- related problems with mentor from their own programme.

The mentors appointed are as listed below:

No.	Name	Room No.	Phone Extension	E-mail Address
1.	Dr. Norhaniza Amil	151	2215	norhaniza_amil@usm.my
2.	Dr. Khozema Ahmed Ali	147	2235	khozema@usm.my

Academic Programme

The School of Industrial Technology offers the following bachelor degrees:

- Bachelor of Technology (Honours) (Food)
- Bachelor of Technology (Honours) (Bioresource)
- Bachelor of Technology (Honours) (Environment)
- Bachelor of Technology (Honours) (Bioprocess)

Acceptance to any of the above programmes is subjected to selection and entry qualification. Most of the first year courses consist of basic science courses in Chemistry, Mathematics, Physics, and Computer. From level 200, all students are required to enrol for courses relevant to their respective programmes up to level 300 (Bioresource and Environmental Technologies) or 400 (Food and Bioprocess Technologies), whereby they are required to conduct one final year research project.

Students are also required to undergo industrial training in various industries relevant to their study programme for 12 weeks. This training is aimed at exposing the students to actual working practice and atmosphere of the industry.

General Educational Goal & Objectives

The general goal of Bachelor of Technology degree programme is to produce graduates who have specialised expertise in their respective technologies (Food, Bioprocess, Environment, and Bioresource) to meet the employment needs of the country for various related industries/agencies.

Therefore, the academic programmes are designed to produce graduates who:

- are competent to work and able to solve problems
- have communication and team work skills
- have leadership skills, positive attitude and professional ethics
- are capable of contributing to the well-being of the society and sustainability of the environment
- have interest in entrepreneurship and lifelong learning

Environmental Technology

This programme, which is spread over three and a half years, is gaining popularity and its importance needs no introduction since environmental problems are reported and discussed everyday globally. This programme is designed to enable our graduates to respond directly to the various environmental challenges they will face upon entering the work force.

Examples of courses taught in this programme include chemical engineering unit operations, water and industrial wastewater treatment (including the design of treatment plants), solid and scheduled waste management, environmental management system, environmental safety, law and regulations, and air and noise pollution. Students will also learn to appreciate the complex issues relating to social, environmental, and economic sustainability.

The curriculum is based on a strong foundation in Chemical Process Engineering for applications in environment related processes. The elective courses offered are in-line with holistic and multidisciplinary educational approach.

Details of Programme

Type of Programme	Structure of Programme
Bachelor of Technology with Elective	Students choose several elective courses to widen their specialisation area and their knowledge in industrial technology.
Bachelor of Technology with Minor	Students choose and complete one minor area offered by other schools. • Starting at the beginning of the second semester of Year 1.

Programme Requirements

Course Code Classification	Normal Programme	Minor Programme	Min. Total Unit Requirements
T	72	72	
E	30	10	
M	0	20	120
U	18	18	

Notes:

T (Core Courses) – compulsory courses for a particular area of specialisation that must be taken and passed.

E (Elective Courses) – courses must be taken by students with Elective programme to strengthen their Technology specialisation courses.

M (Minor Courses) – minor specialisation offered by another school.

U (University Requirements) – courses to fulfil the University requirements.

Graduation Requirements

☑ Fulfil the minimum required (7 semesters) of the residential requirement for the programme of study and has not exceeded the maximum period of study (12 semesters).

☑ Fulfil all credit requirements of the courses for the programme of study required units such as the requirements for each component (Core, Elective/ Minor and University courses/Option).

☑ Obtained a CGPA of 2.00 and above for Core components.

☑ Obtained a CGPA of 2.00 and above for the programme.

☑ Achieved a minimum of 'C' grade or a grade point of 2.00 for Bahasa Malaysia, English Language (4 units), Appreciation of Ethics and Civilisations, Philosophy and Current Issues, and Core Entrepreneurship.

University Requirements for Graduation

LOCAL STUDENTS	
Compulsory Courses	**Units**
❖ LKM400/2 Bahasa Malaysia IV	2
English Language **(MUET Band 6)**	
❖ (LHP451/452/453/454/455/456/457/458/459) **and/or**	
❖ Foreign language courses	
English Language **(MUET Band 5)**	
❖ LSP402/2 Scientific and Medical English **and**	
❖ LHP451/452/453/454/455/456/457/458/459	
English Language **(MUET Band 2 – 4)**	4
❖ LSP300/2 Academic English **and**	
❖ LSP402/2 Scientific and Medical English	
English Language **(MUET Band 2 – 3)**	
❖ LMT100/2 Preparatory English* **or**	
❖ Re-sit MUET	
Prerequisite for LSP300/2 Academic English	
❖ HFE224/2 Appreciation of Ethics and Civilisations	2
❖ HFF225/2 Philosophy and Current Issues	2
❖ WUS101/2 Core Entrepreneurship	2
❖ Co-curricular	2
Optional Courses	**Units**
❖ Co-curricular/Skills Courses/Foreign Language Courses/Options	
❖ WSU101/2 Sustainability: Issues, Challenges & Prospect	4
❖ HTV201/2 Thinking Techniques	
Minimum Requirements	**18**

INTERNATIONAL STUDENTS	
Compulsory Courses	**Units**
❖ LKM100/2 Bahasa Malaysia I	2
❖ English Language courses	4
Students may obtain advice from the School of Languages, Literacies and Translation if they have different English Language Qualification.	
❖ SEA205E/4 Malaysian Studies	4
❖ Option/Bahasa Malaysia/English Language	2
❖ Co-curricular	2
Optional Courses	**Units**
❖ Co-curricular/Skills Courses/Foreign Language Courses/Options	
❖ WSU101/2 Sustainability: Issues, Challenges & Prospect	4
❖ HTV201/2 Thinking Techniques	
Minimum Requirements	**18**

*Student must pass all University courses with the minimum grade of C.

Curriculum Structure

COURSE TYPE	LEVEL 100 (2020/2021) SEMESTER 1	LEVEL 100 (2020/2021) SEMESTER 2	LEVEL 200 (2021/2022) SEMESTER 1	LEVEL 200 (2021/2022) SEMESTER 2	LEVEL 300 (2022/2023) SEMESTER 1	LEVEL 300 (2022/2023) SEMESTER 2	LEVEL 400 (2023/2024) SEMESTER 1	LEVEL 400 (2023/2024) SEMESTER 2	TOTAL UNIT
CORE (T)	IEG 101/3 IEK 101/3 IUK 108/4 IUK 191/4	IEK 115/3 IEK 108/3 IEG 104/3	IEK 212/3 IEA 216/3 IEK 218/3	IEA 201/2 IEK 205/3 IEK 213/3 IEK 219/3 IEK 211/3	IEA 304/6*	IEA 300/3 IEK 307/3 IEK 308/3 IEA 313/8**	IEK 409/3 IEA 313/8**		72
(subtotal)	14	9	9	14	6	13	7	SEMESTER BREAK	
ELECTIVE (E)	BOM 112/4	IBG 111/3 IEA 112/4 IUK 291/4	IUK 107/4 HGT 321/3 IEA 202/2	IEK 217/3 IUK 208/3		IEG 301/3 IEK 315/3	IEK 414/3		30
(subtotal)	4	11	9	6		6	3		
UNIVERSITY (U)	WUS 101/2 Ko-K/1	Ko-K/1 WSU101/2 Ko-K/Skill Courses/ Foreign Languages Courses/Option/2	HFF 225/2 LKM 400/2 LMT 100/2 or LSP 300/2	HFE 224/2		LSP 300/2 or LSP 402/2 HTV 201/2	LSP 402/2		18
(subtotal)	3	5	6	1		4	2		
TOTAL MINIMUM CREDIT FOR GRADUATION									120

* Students must register for this course online during their internship.

** Course is offered in TWO (2) semesters (unit counted per semester is 4).

List and Synopsis of Courses

Level 100

1. BOM112/4 Basic Ecology

Basic ecological concepts such as ecosystems, community and populations will be taught. Functional aspects of ecosystems including factors controlling distribution of organisms, primary and secondary productions and succession will also be discussed. The function and characteristic of ecosystem by considering different ecosystem, *i.e.* tropical rainforest, savanna, desert, and marine, will be emphasised. Field work techniques will be included.

2. IBG111/3 Industrial Microbiology

Discusses the involvement of microorganisms in industrial processes, specifically in the production of various product materials including enzymes, food, beverages, fuels, pharmaceutics, organic solvents, cell biomass, and also clean technology that is used for waste treatment and pollution control. Emphasis will be given on the determination of important industrial microorganism, selection and isolation methods, maintenance, storage, improvement of industrial microorganisms, and the involvement of microorganisms in various industries. Relevant practical classes will also be conducted.

3. IEA112/4 Society and Environment Project

This course introduces students to the community and the environment through the interdisciplinary discipline of natural sciences with socio-political sciences and links environmental-ecological, social and economic aspects toward achieving sustainable societies. Students will be exposed to the concept of capitalism encompassing the world's economic-political system in line with the environmental-ecological crisis. Students will be encouraged to discuss and articulate their views on the interests of various conflicting parties, for example between government, corporate and non-governmental environmental activists. Students will also propose and implement appropriate, individual and group social projects on the exploitation of natural resources and waste generation by the industrial community.

4. IEG101/3 Introduction to Environmental Science

This course introduces Environmental Science as a basis to Environmental Technology. Students are exposed to the fundamentals of environmental chemistry and environmental microbiology including field and laboratory work.

5. IEG104/3 Introduction to Environmental Technology

This course introduces the development of environmental technology. Definitions that distinguish the areas of environmental engineering versus applied and pure sciences will be elaborated. This course will focus on the introduction of application-related technology to address the problems of global pollution. In addition, some basic analyses of environmental pollution (water, air, soil, and noise) will be introduced through laboratory and field work.

6. IEK101/3 Chemical Process Calculations

This course is about general calculations involved in chemical processes. The students will be exposed to mass and energy balance and the steps needed to solve related problems. These topics will help the students solve problems effectively through the correct problem-solving methodology, relevant data collection and data analysis. This course also introduces the student to the properties and phase behaviour of steam, gases as well as basics of chemistry and physics.

7. IEK108/3 Process Fluid Mechanics   *Course Prerequisites: s IEK101/3*

This course introduces students to the concept of fluid statics, incompressible and compressible fluid flow, as well as flow across submerged bodies. Students will also be exposed to the topics of metering, separation, mixing, and pumping. Other topics include Fanning friction factor, pumping power and cost, as well as flow rate calculations.

8. IEK115/3 Environment, Safety and Health Legislation

This course exposes the student to the concept of environmental, occupational safety and health management based on two main acts, Environmental Quality Act 1974 and the Occupational Safety and Health Act 1994. This course uses a case study learning approach.

9. IUK107/4 Chemistry for Technologist

This syllabus is aimed to be comprehensive in scope and mainly intended to strength the applied chemistry background of the students. Students will learn the basics of inorganic chemistry, nuclear and radiochemistry, organic chemistry, and instrumental analysis. Spectroscopy methods such as FT-IR, NMR, ICP, and AAS will be used for the characterisation of functional groups, hydrogen atoms characterisation, and analysis of inorganic elements.

10. IUK108/4 Statistic with Computer Applications

This course discusses on probability models for quality control of discrete random variation: random variation, cumulative distribution function, mean, variance and standard deviation. The course also discusses Discrete distribution: hypergeometric distribution, Binomial distribution, Poisson distribution, Continuous distribution, Normal distribution, exponential distribution and uses in reliability modelling.

11. IUK191/4 Mathematics I

This course introduces the concepts of functions and limits of single variable. Linear, polynomial, logarithmic, exponential and trigonometry functions will be discussed. The focus will be on the understanding of concept and solving of differentiation and integration with applications. Students are then introduced to differential equations focusing on separable differential equation and first-order linear equations. Matrices and determinants are taught in solving systems of linear equations by using Gauss and Cramer methods.

Level 200

12. IEA201/2 Unit Operations Laboratory   *Course Prerequisites: s IEG104/3 & c IEK213/3*

This course consists of practical work based on chemical process engineering unit operations principles taught in the following courses: IEK108/3 Process Fluid Mechanics, IEK212/3 Process Heat Transfer, and IEK213/3 Mass Transfer and Separation Processes.

13. IEA202/2 Environmental Bioindicators   *Course Prerequisites: s IEG101/3 & s IEG104/3*

This course provides an understanding of the concept of using biological indicators in ecosystems. The use of this biological indicator is based on the tolerance or existence of an organism in the terrestrial and aquatic ecosystem as a first step of detecting environmental changes.

14. IEA216/3 Computer Applications in Industry   *Course Prerequisites: s IEK101/3*

This course introduces the student to the application of computers in Environmental Technology. The course comprises of two parts: a programming software and AutoCAD. The programming software part focuses on the use of computer programming in Environmental Technology. The student will be exposed to commands, the concept of function, statistical tools, and to the computer programming flow chart to develop a useful function to meet Environmental Technology challenges. The AutoCAD part exposes the student to the use of AutoCAD to produce engineering drawings that are clear and appropriate.

15. IEK205/3 Air Pollution Control Technology   *Course Prerequisites: s IEG104/3*

This course exposes students to industrial air pollution problems and control methods. Among the items studied are air quality management, air pollution control devices, meteorological aspects and air pollution dispersion modelling.

16. IEK211/3 Equipment Design for Water Treatment   *Course Prerequisites: s IEG104/3*

This course provides exposure on water resources, water characterisation and drinking water standards. This course also explains the water demand, water reticulation system, equipment design of water treatment, and water distribution system.

17. IEK212/3 Process Heat Transfer   *Course Prerequisites: s IEK101/3*

This course introduces the student to the fundamental principles of heat transmission by conduction, convection, radiation, and evaporation. This course will also discuss on the applications of these principles to the solution of industrial heat transfer problems and the design calculations for industrial heat exchanger equipment.

18. IEK213/3 Mass Transfer and Separation Processes   *Course Prerequisites: s IEK101/3*

This course introduces the students to the concepts and principles of mass transfer and separation processes. Additionally, unit operations, such as distillation, absorption, adsorption, humidification, filtration, centrifugation, and drying, will be discussed.

19. IEK217/3 Environmental Management

This course exposes the students to the concept of planning, implementation and management of the environment through systematic methods. The methods mainly discussed in this course are the Environmental Management System in-line with the international standard ISO 14001 and Environmental Impact Assessment (EIA) along with Environmental Management Plan (EMP). Furthermore, students will learn other methods, such as environmental performance evaluation, environmental labelling and Life Cycle Assessment (LCA).

20. IEK218/3 Treatment and Management of Solid Wastes   *Course Prerequisites: s IEG104/3*

This course introduces treatment and management of solid waste. This course also exposes the students to the legislation, characterisation, generation, collection, transport, disposal, solid waste process, and leachate treatment. Concepts related to landfill design will also be discussed.

21. IEK219/3 Treatment and Management of Scheduled Wastes

This course covers treatment and management of scheduled waste according to Environmental Quality (Scheduled Wastes) Regulation 2005. The management of scheduled wastes, from its generation until its disposal, is discussed. Environmental pollution prevention and minimisation will also be elaborated. Physical, chemical, and biological treatments of scheduled waste will be summarised.

22. IUK208/3 Experimental Design with Computer Applications

This course discusses on the Replication, Randomisation, Blocking, and Definitions in Experimental Design (Experiment, Treatment, Factor, Level, Experimental unit, Experimental design, Random, Replicate).
Completely Randomised Design: Randomisation, Analysis of variance, equal replication and unequal replication, Estimation of the model Parameters, Comparison of Individual Treatment Means: Comparing of pair Treatment Means, Comparing with a control, orthogonal contrast.
Randomised Block Design: blocking, Randomised block design, Model and Assumptions, Missing values, Relative efficiency. Latin Square design Incomplete Block design: balanced incomplete block designs, Partially Balanced incomplete block designs.
Factorial Experiments (Designs): General factorial experiments, 2k Factorial experiment, 3k factorial experiment, Confounding, regression analysis, Response surface: Method of steepest ascent, Analysis of second-order model, Location of stationary point, Designs for fitting the first-Order and second-order models. Mixture experiments.

23. IUK291/4 Mathematics II   *Course Prerequisites: s IUK191/4*

This course expands the concepts of functions and limits to two variables. Linear, polynomial, logarithmic, exponential and trigonometry functions will be discussed. The focus will be on the understanding and solving partial derivatives of differentiation and solving double and triple integration with simple applications. Students are then introduced to differential equations focusing on separable differential equation and second-order linear equations. Infinite series, Taylor-MacLaurin series and Fourier series are taught with a view to examine the theory and properties of certain functions that can be represented as sums of series.

Level 300

24. HGT321/3 Technology and Geographic Information

This course aims to describe concepts, process and application of technologies and geographic information which include remote sensing, global positioning system, and geographic information systems in solving spatial problems. The course emphasises on the application of digital remote sensing data in land use mapping and coastal zone management. It also discusses the application of GIS and GPS in urban and regional planning, business and service planning and assessment of socio-economic data in solving spatial problem. The skill acquired from this course allows students to assess and analyse spatial problems as well as look for solution using technology and geographic information.

25. IEA300/3 Environmental Technology Laboratory

This course exposes the students to various treatment and measuring methods in noise, air, water, solid wastes, and wastewater treatment through experiments.

26. IEA304/6 Environmental Technology Industrial Training

Course Prerequisites: Students have completed FOUR (4) semesters of study, regardless of the accumulated units.

This course involves placement of students to undertake internship at industries. During the internship, student are able to gain an insight into industrial practices and appreciate how principles of science, technology and management are applied in the actual workplace.

27. IEA313/8 Environmental Technology Research Project

****Course is offered in TWO (2) semesters*
Course Prerequisites:
   (i)   Students must take all core courses of levels 100 and 200.
   (ii) Students have collected at least 40 credit units of core courses.

This course will introduce the student problems relating to Environmental Technology. Through research, the student will be tasked to solve the problem. Lecturers will supervise the students in carrying out the literature search, laboratory work, and dissertation writing. The student will also attend a series of lectures on research philosophy, experimental design, scientific thinking, laboratory safety, thesis writing, Viva Voce presentation.

28. IEG301/3 Environmental Forensics   *Course Prerequisites: s IUK108/4*

This course provides basic knowledge in environmental forensics by emphasising the use of the relevant methods which are suitable to solve key environmental pollution questions. These methods include chemical and DNA fingerprinting techniques. Chemical fingerprinting techniques to be discussed are mass spectrometry, trace metal analysis, and stable isotopes analysis of light elements, whereas the DNA fingerprinting technique covers methods of DNA extraction and detection of toxin encoding gene. In addition, multivariate statistical methods will be taught to the students in order to recognise patterns of data, and thus obtaining the best information and interpretation from the analyses carried out. At the end of this course, students should know how to organise information and data from various sources in order to tackle the challenges in environmental forensics using critical and logical thinking.

29. IEK307/3 Noise and Vibration Control Technology   *Course Prerequisites: s IEG104/3*

This course exposes the student to the physical principles of sound, noise and vibration. The student will be taught data collection and analysis techniques. This course will also expose the student to suggest solutions of noise and vibration problems from the aspect of technology and legislation.

30. IEK308/3 Industrial Wastewater Treatment Plant Design

In this course, students will be given a project to design a waste water treatment plant. Students are required to integrate the relevant unit operations, taking into account the main objective of meeting the current environmental legislations. Basic and methods of treatment (physical, chemical, and biological) will be discussed.

31. IEK315/3 Indoor Environment

This course explains basic terms, parameters, effects (good and poor) of indoor environment and its relationship with humans, building energy consumption and the environment. Students will learn methods of planning, management and indoor environmental control technology of indoor environment in order to achieve healthy working and living conditions of indoor spaces. In addition, legislations, regulations, standards and guidelines at national and international levels on indoor environment will be discussed.

Level 400

32. IEK409/3 Chemodynamics

Chemodynamics is a study of the transport and fate of chemical substances within the three environmental geospheres: water, air, and solids. Course objectives are to introduce and evaluate current methods or models for materials transport from an environmental entry site to the various geospheres, so that environmental exposure can be estimated.

33. IEK414/3 Environmental Audit

In this course, the basic principles of environmental auditing will be discussed. Students will learn how to plan, prepare, conduct an environmental audit and to write an audit report. Also, students will be exposed to the topics of the energy audit, waste audit, occupational safety and health audit, qualification and registration process of auditors as well as risk assessment.

Minor Programmes

All students that choose to do Industrial Technology with Minor programme must choose one minor programme and commence their minor study in the second semester of the first year of their studies. These students must complete 20 units of the courses in the minor package.

Among the minor programmes offered are:

School	Minor Package	Code
School of Biological Sciences	Biology	0B01
School of Physics	Physics	0Z01
School of Chemical Sciences	Chemistry	0k01
School of Mathematical Sciences	Mathematics	0M01
School of Humanities	English Language	0H01
	Malay Linguistics	0H02
	Geography	0H03
	Literature	0H04
	Islamic Studies	0H05
	History	0H06
	Japanese Studies	0H11
	Philosophy and Civilisations	0H15
	Translation and Interpretation	0H14
School of Language, Literacies, & Translation	Japanese Language Studies	0L01
	Chinese Language Studies	0L02
	Communicational Arabic	0L06
School of Art	Fine Arts	0H07
	Performing Arts	0H08
	Musics	0H09
	Drama and Theatre	0H10
	Communicational Graphics	0H12
	Acting and Directing	0H13
	Music Technology	0V01
School of Communication	Communication Studies	0Y05
	Science and Environment Journalism	0Y06
School of Management	Management	0A03
Centre for Global Archeological Research	Archeology	0U01

School	Minor Package	Code
School of Social Science	Anthropology and Sociology	0S01
	Economics	0S02
	Social Development and Administration	0S04
	Political Science Development	0S05
	Planning and Management	0S07
	Industrial Relation Public	0S08
	Policy and Administration	0S09
	International Relation	0S10
	South-East Asian Studies	0S11
	Psychology	0S12

The following minor programmes are popular among students of the School of Industrial Technology:

(a) Communication Studies (0Y05)

No.	Code/Units/Course Title
	A. Compulsory (9 credits)
	i) Choose any 1 course (3 credits)
1.	YKT101/3 Introduction to Human Communication
2.	YKT102/3 Introduction to Mass Communication
3.	YKT104/3 Introduction to Communication Studies
	ii) Choose any 2 courses (6 credits)
4.	YKT218/3 Communication Theory 1
5.	YKT220/3 Communication Theory 2
6.	YBP201/3 Communication for Sustainable Development
	B. Choose (11 credits)
7.	YFP324/3 Cinema Studies
8.	YFP321/3 Television Studies
9.	YBP224/3 Public Relations
10.	YBP326/3 Corporate Communication
11.	YBP300/3 Integrated Marketing Communication
12.	YWP223/3 Feature Writing
13.	YKT221/3 Media Laws and Ethics
14.	YWP315/3 Media and Gender

(b) Psychology (0S12)

No.	Code/Units/Course Title
1.	STU231/4 Foundation in Psychology (*Compulsory*)
	Choose any 3 courses (12 credits)
2.	STU241/4 Health Psychology
3.	STU242/4 Social Psychology
4.	STU243/4 Development Psychology
5.	STU244/4 Abnormal Psychology
6.	STU337/4 Counselling

(c) Management (0A03)

No.	Code/Units/Course Title	Title Semester
1.	AKW103/4 Introduction to Management	I & II
2.	AKW104/4 Accounting and Finance	I & II
3.	AKP201/4 Marketing	I & II
4.	AKP202/4 Organisational Behaviour	I & II
5.	AKP302/4 Operation Management	I & II

Course 1 and 2 are compulsory and pre-requisites to other courses.

(d) Economics (0S04)

No.	Code/Units/Course Title
1.	SKE109/3 Principles to Economics Issues (*Compulsory*) - Sem. II
2.	SEW101/3 Microeconomics (*Compulsory*) - Sem. II
3.	SEW103/3 Macroeconomics (*Compulsory*) - Sem. II
	Choose any 3 courses (11 credits)
4.	SEU226/4 Labour Economics
5.	SEU228/4 Malaysian Economy
6.	SEU333/3 Industrial Organisation
7.	SEU334/3 Money, Banking and Financial Markets
8.	SEU336/3 Environmental and Natural Resources Economics
9.	SEU339/3 Economic Planning and Project Analysis

(e) Islamic Studies (0H05)

No.	Code/Units/Course Title
	Package A (12 credits)
1.	HIA101/4 Introduction to Islamic Studies (*Compulsory Grade C*)
2.	HIU123/4 The Islamic Creed: Concept and Realisation
3.	HIS213/4 Sources and Principles of Islamic Laws
	Package B (8 credits)
4.	HIS224/4 The Islamic Family Institution
5.	HIU226/4 Akhlaq and Islamic Spiritual
6.	HIS311/4 Zakat and Wakaf
7.	HIS315/4 Mu'amalat: Concept and Application
8.	HIU321/4 Al-Quran, Tawhid, and Science

For students wishing to register for minor programme, please make sure that time-tabling and course scheduling allows you to graduate in the stipulated period. See Minor Programmes Handbook for further information on Minor Specialisations.

"Tell me and I forget. Teach me and I remember. Involve me and I learn"

–Benjamin Franklin–

Get enough sleep, especially the night before your exam. Have regular short breaks every 60 min to help you focus better.

Start studying early and plan your study time in advance. Use a calendar and write down what you are planning to do each day.

Eat healthy food that fuels your brain. Food like apples, walnuts, and blueberries can improve your ability to focus, retain information and remain mentally alert.

Avoid any distraction. Turn off your phone and the television, and check your social media updates only during the break time.

STUDY TIPS
to be more productive

Use mind maps to visualise your topics better, improve your memory, and prioritise information.

During high intensity study periods, it is recommended to take breaks to exercise. It will make you feel more energised and refreshed.

Some people find that listening to music whilst studying helps them being more productive. If that's your case, keep the volume low and play songs that you don't find yourself singing along to.

Treat yourself! After taking an exam, meet a friend for coffee, go to the cinema or just take a well-deserved break before starting to study for your next exam.

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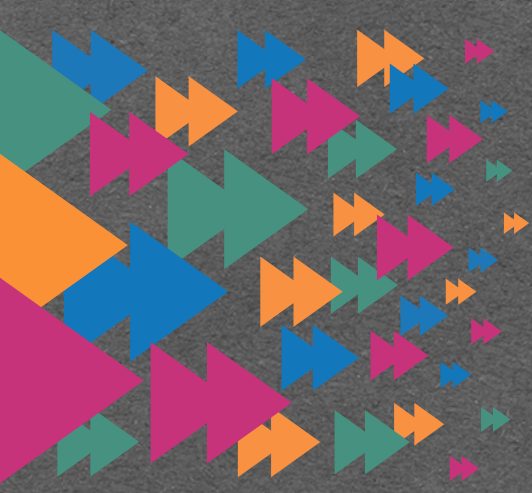
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School of Industrial Technology
Universiti Sains Malaysia
11800 USM, Pulau Pinang, Malaysia
Tel. no.: +604-653 2219/2260 | Fax no.: +604-653 6375
Email: dean_ind@usm.my