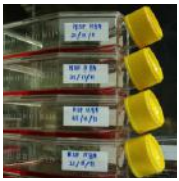







FACULTY OF

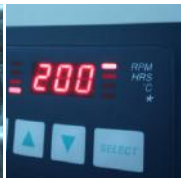
CHEMICAL ENGINEERING

UNIVERSITI TEKNOLOGI MALAYSIA

Postgraduate

HANDBOOK

2012/2013



Postgraduate HANDBOOK 2012/2013

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UNIVERSITI TEKNOLOGI MALAYSIA

Universiti Teknologi Malaysia (UTM) is a premier university in engineering, science and technology. It is located in Johor Bahru, the southern city in Iskandar Malaysia which is a vibrant economic corridor in the south of Peninsular Malaysia.

It is renowned for being at the forefront of engineering and technological knowledge and expertise, contributing to the technical and professional workforce of the nation since its inception in 1904. UTM has also established a reputation for cutting-edge research undertakings and innovative education, proven by becoming the two-time winner of the National Intellectual Property Award for organization category. Its mission is to lead in the development of creative and innovative human capital and advanced technologies that will contribute to the nation's wealth creation. This is in line with the aspirations of the country to be a fully-developed and knowledge-rich nation by the year 2020.

UTM has more than 10 research alliances and 28 centres of excellence in addition to academic faculties to service technological education and research needs of the nation. There are more than 13,000 full-time undergraduate students in UTM and more than 5,000 enrolled on distance learning programmes as part-time students. In addition, there are more than 10,000 postgraduate students in various fields of specialisation.

Having produced more than 200,000 technical graduates and qualified professionals over the years, UTM has earned its place as Malaysia's premier university in Engineering and Technology which inspires creativity and innovation.

LIFE IN CAMPUS

UTM provides students with a conducive environment for learning and acts as a one stop agency for services related to health, accommodation, financial aid, students' general welfare and more.

At present, there are 17 residential colleges on the main campus, which can accommodate more than 15,000 students. There are many types of room available in each college; single, 2-person, 3-person and 4-person. Some colleges provide single accommodation for graduate students with each room having a network port and its own attached bathroom. Married students residential are also available on campus.

The University also provides transport services for students to commute from their on-campus residential colleges to classes. The buses provide services from 7.15 am to 11.30 pm daily. In addition, there are also public buses such as the Transit Link and Maju bus companies, which ply between Taman Universiti via the ring road of the campus to Johor Bahru City Centre. Other facilities include library, cafeteria, sport centre and newly built stadium.


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FACULTY OF CHEMICAL ENGINEERING

FACULTY: IN BRIEF

The faculty gains its distinguished name on 1st June 2010 after the Faculty of Chemical and Natural Resources Engineering (FKKKSA) which was split into two faculties: Faculty of Chemical Engineering (FChE) and Faculty of Petroleum and Renewable Energy Engineering (FPREE). Undergraduate programs are offered since its inception under FKKKSA in 1983 and postgraduate programs are offered since 1998.

Under the new management, a vibrant research environment was promoted so as to achieve UTM aspiration towards Vision 2020. FChE is geared up towards postgraduate focus faculty and will become a referral centre for research related to chemical engineering. The FChE is to become an important structural component in the formation of UTM entrepreneur research university by 2020.

FChE is led by a Dean and assisted by two Deputy Deans, four Head of Departments, an IT Manager, a Deputy Registrar and an Assistant Registrar. The faculty is divided into three different Departments:

- Bioprocess Engineering
- Chemical Engineering
- Polymer Engineering

The Head of Post Graduate Studies, assisted by Programme Coordinators manages the post graduate matters to ensure smooth running of all the programmes.

VISION

To be a world-class centre of academic and technological excellence in chemical engineering

MISSION

To lead the development of human capital and innovative technologies in chemical engineering

OBJECTIVES

- To produce graduates who are trained in Chemical, Polymer and Bioprocess Engineering. Besides being skilled in their fields of study, the graduates are trained to be responsible professionals that are able to face challenges.
- To develop and contribute to the industry, locally and abroad.
- To be the centre of research and consultancy in the fields related to chemical engineering.

FCHE MANAGEMENT TEAM

Dean
Dr. Zainuddin Abdul Manan
Professor

Deputy Dean
(Academic)
Dr. Ramli Mat
Associate Professor

Deputy Dean
(Research & Graduate Studies)
Dr. Fadzilah Adibah Abdul Majid
Associate Professor

Head of Department
(Bioprocess Engineering)
Dr. Ida Idayu Muhammad
Associate Professor

Head of Department
(Chemical Engineering)
Dr. Mohd Ghazali Mohd Nawawi
Associate Professor

Head of Department
(Polymer Engineering)
Dr. Shahrir Hashim
Associate Professor

Head of Graduate Studies
Dr. Mohamad Wijayanuddin Ali
Associate Professor

Manager of Information System
Dr. Saharudin Haron

Manager of Laboratory
Associate Professor
Adnan Ripin

Deputy Registrar
(Human Resource)
Hajjah Halijah Sawal

Senior Assistant Registrar
(Academic)
Saidatul Akmal Abdul Hamid

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POST GRADUATE PROGRAMME

PROGRAMME MODES

TAUGHT COURSE

The faculty offers two modes of post graduate programmes.

TAUGHT COURSE

The candidate must complete a minimum of 40 credits, and must obtain a final academic grade of at least 3.0 CGPA (Cumulative Grade Point Average). The minimum 40 credit taught course consists of several subject modules including faculty compulsory, faculty electives, a university elective module and a Master's project. Each module normally carries 2 or 3 credits, and assessment is by examinations and assignments. The Master's project must be completed in one or two semesters, is assessed through a research proposal seminar, a final project report and an oral examination.

Programmes offered are:
Master of Engineering (Chemical)
Master of Engineering (Bioprocess)
Master of Science (Polymer Technology)
Master of Science (Process Plant Management)
Master of Science (Safety, Health and Environment
Master of Science (Herbal Technology)
Doctorate of Engineering (Process Plant Management)

BY RESEARCH

Each Master or PhD is supervised by a selected Graduate Faculty. The directed research work introduces candidates to the processes by which new knowledge is developed and applied accordingly. The academic progress of a candidate is assessed through a research progress report submitted at the end of each semester. The degree is awarded based on an oral examination (viva voce) of the thesis submitted by the candidate upon completion of study.

Programmes offered are:

- Master of Engineering (Bioprocess)
- Master of Engineering (Chemical)
- Master of Engineering (Environmental)
- Master of Engineering (Polymer)
- Doctor of Philosophy (Bioprocess Engineering)
- Doctor of Philosophy (Chemical Engineering)
- Doctor of Philosophy (Environmental Engineering)
- Doctor of Philosophy (Polymer Engineering)
- Doctor of Philosophy (Bioprocess Engineering Design)

Master of Engineering
CHEMICAL
Taught Course

Master by taught course and research in Chemical Engineering provides o pportunity for candidates to enhance their technical knowledge in advanced chemical engineering fields including process thermodynamics, transport phenomena, computational methods, safety, separation technology and adequate exposure on emerging technologies such as in sustainability, biotechnology, membrane separation, polymer, food and phyto-chemical technology. Course assessment is based on group or individual assignments, reports, presentations, tests, exams and projects. The course also provides students with some research exposure via a one and a half semester long research project.

This programme is suitable for any bachelor graduate from science, technology and engineering courses. Graduates from other discipline but with relevant experiences are also encouraged to apply. Depending on the candidate's background, pre-requisite subjects may be imposed to assist the candidate to comprehend more in-depth advanced subjects offered.

PROGRAMME OBJECTIVES

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

1. Integrate in-depth engineering and scientific knowledge in professional practices for the benefit of chemical engineering discipline.
2. Formulate hypothesis, design and reorganize experiments/research scientifically to solve and evaluate observed phenomena.
3. Analyse situation, justify and react effectively through oral and written to scientific, industry and public communities.
4. Demonstrate professional ethics in research and explain ethics related with chemical engineering from social and material aspects.
5. Select and use contemporary knowledge independently and manage information effectively.
6. Demonstrate managerial skills and identify business opportunities in chemical engineering.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The full time mode will only commence with minimum enrollment of 5 students. Minimum length of study is 3 semesters and maximum is 6 semesters. Lectures for part time mode are conducted during working hours. However, student can take a minimum of 1 subject per semester.

The candidate must complete a total of 42 credits as follows:

University elective	3 credits
Core courses:	
Advanced Thermodynamic	3 credits
Transport Phenomena	3 credits
Numerical Computation in Chemical Engineering	3 credits
Safety and Health in Chemical Industries	3 credits
Elective courses (Choose 2):	
Advanced Reaction Engineering	3 credits
Multiphase Reactor Analysis	3 credits
Polymer Material for Chemical Engineers	3 credits
Energy Analysis and Management	3 credits
Process Integration	3 credits
Supercritical Fluid Extraction	3 credits
Artificial Neural Network	3 credits
Engineering Biotechnology	3 credits
Industrial Bioprocessing	3 credits

*All elective subjects depend on availability. New elective subject may be offered from time to time.

Other courses	
Dissertation I*	6 credits equivalent
Dissertation II	15 credits equivalent
Research methodology	Compulsory attendance
Total	**42 credits**

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in Chemical Engineering with CGPA of at least 3.0/4.0 (or equivalent) from a recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

Candidate holding a Bachelor Degree in other engineering or science disciplines may also apply but are required to take a one-semester conversion courses as listed below:

- Principles of Chemical Processes
- Chemical Reactions Engineering
- Chemical Engineering Thermodynamics
- Numerical methods
- Transport Processes and Unit Operations

AWARD

For the award of Master of Engineering (Chemical), the students should achieve a total minimum of 42 credit hours with minimum CGPA of 3.0, including completion of Master Project.

Programme Coordinator:
Mohd Kamaruddin Abd Hamid
Room N01-203,
Tel: +607-5535517
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Master of Engineering
BIOPROCESS
Taught Course

Postgraduate study in Bioprocess engineering concentrates on applying chemical engineering principles to natural biological processes to develop innovative technologies for a sustainable future. The overall aim of this programme is to combine modern molecular biology, advanced modelling and fundamental chemical engineering principles with the design of novel bioprocesses for applications in fields of biotechnology, such as bio-transformations, biopharmaceuticals, waste water treatment, mammalian cell cultures, stem cell bioprocessing and tissue engineering.

PROGRAMME OBJECTIVES

1. Practice in-depth knowledge and skills of bioprocess engineering and in related fields.
2. Demonstrate effective communication skills to a wide variety of audiences and practice professional, ethical, environmental and societal responsibilities, and tolerate/value different global and cultural perspectives.
3. Show adaptability in different roles, responsibilities, surroundings and communities, enabling them to contribute and lead in their organizations and society.
4. Demonstrate business acumen and higher-order thinking skills necessary to solve problems through innovation and creativity which also drive them to be lifelong learners.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

This programme is offered on full-time and part-time basis and based on a 2-Semester Academic Year. The short semester is optional but can also be used to offer courses for students to prepare for the final completion of their programme. Courses are assessed completely for each semester.

The candidate must complete a total of 40 credits as follows:

University elective	3 credits
Core courses	
Biotechnology for Engineering	3 credits
Industrial Bioprocessing	3 credits
Facilities and Infrastructure in Bioprocess Engineering	3 credits
Bio-product Developmentt	3 credits
Other courses	
Bioprocess Research Project 1	8 credits
Bioprocess Research Project 2	20 credits
Total	40 credits

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in any field of science, technology and engineering with CGPA at least 3.0/4.0 (or equivalent) from recognized Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to the Appendix A.

AWARD

For the award of Master of Engineering (Bioprocess), the students should achieve a total minimum of 40 credit hours with minimum CGPA of 3.0, including completion of Master Project.

Programme Coordinator:
Dr Liza Md. Salleh
OfficE : N01-244
Phone : 07-5535551
E-mail : i.liza@cheme.utm.my

Master of Science
POLYMER TECHNOLOGY
Taught Course

Polymeric materials have become an essential and ubiquitous part of our lives. The materials are widely utilized in many applications ranging from household items to engineering applications such as building, aerospace, automotive and electrical equipment.

In order to meet the manpower and R&D demand of the industry, the Department of Polymer Engineering, FChE UTM offers Master in Polymer Technology (taught course).

PROGRAMME OBJECTIVES

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

1. Practice in-depth knowledge and skills of polymer technology and related fields.
2. Develop research for knowledge enhancement in the area of polymer technology
3. Demonstrate effective communication skills to a wide variety of audiences and practice professional, ethical, environmental and societal responsibilities, and tolerate/value different global and cultural perspectives.
4. Adapt to different roles, responsibilities, surroundings and communities, enabling them to contribute and lead in their organizations and society.
5. Demonstrate business acumen and higher-order thinking skills necessary to solve problems through innovation and creativity which will also drive them to be lifelong learners.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

- Full-time: Minimum of 1 and a half year (3 semesters)
- Part-time: Minimum of 2 years (4 semesters)*

* Class is normally arranged after 5 p.m.

The candidate must complete a total of 42 credits as follows:

University elective	3 credits

Core courses:

Polymer Synthesis	3 credits
Polymer Characterisation	3 credits
Polymer Physics and Properties	3 credits
Polymer Technology 1	3 credits
Polymer Technology 2	3 credits

Elective courses (Choose 1)

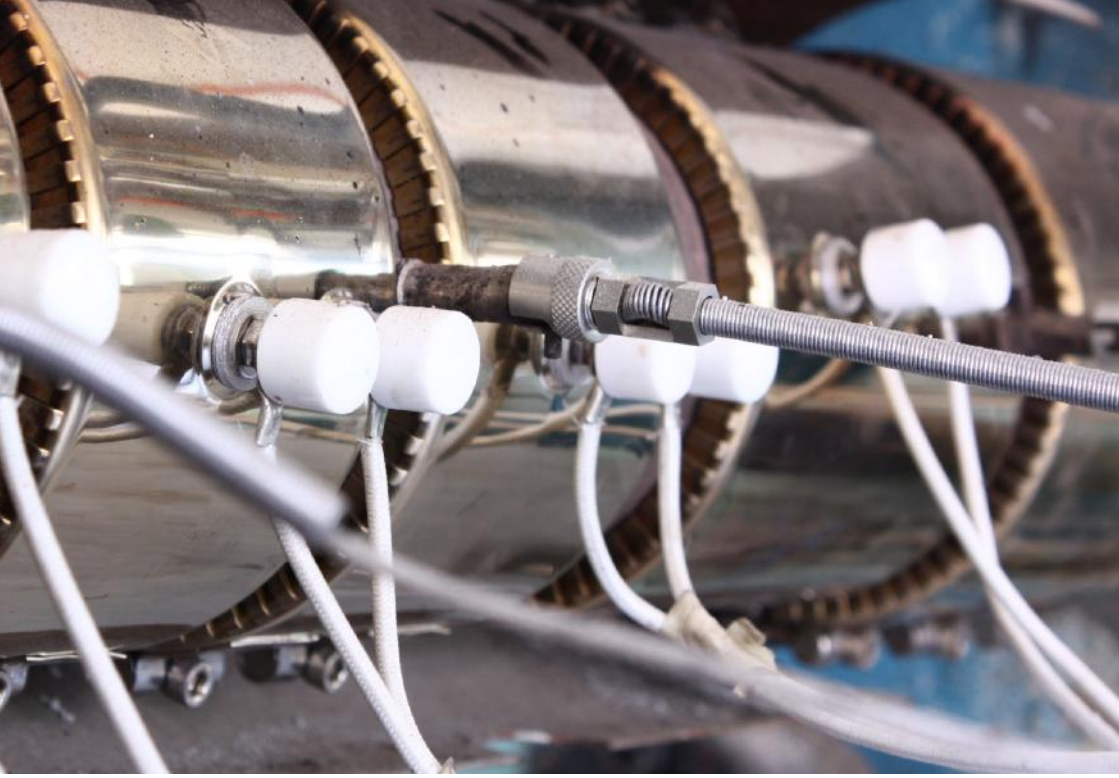
Rubber and Latex Technology	3 credits
Surface and Foam Technology	3 credits

Other courses:

Dissertation I*	6 credits equivalent
Dissertation II	15 credits equivalent
Research Methodology	Compulsory attendance
Total	42 credits

Dissertation Areas:

Plastic-Rubber Blend
Modification and Processing of Polymer
Recycling of Plastics Waste
Fibre-Reinforced Composite
PVC Technology
Polymer Synthesis and Characterisation
Biopolymers
Polymer Nanocomposites
Natural Fibre Reinforced Polymeric Materials
Microwave Processing of Polymers



ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in chemistry, physics, biology, technology or engineering with CGPA of at least 3.0/4.0 (or equivalent) from a Recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

Candidates with other Bachelor of Science degree must have at least 3 years of minimum working experience in the relevant field and must pass with minimum B- for SKV 2513 - Introduction to Polymer Science & Engineering as an extra course.

AWARD

For the award of Master of Science (Polymer Technology), the students should achieve a total minimum of 42 credit hours with minimum CGPA of 3.0, including completion of the Master Project.

Programme Coordinator:
Assoc. Prof. Dr. Abdul Razak Rahmat
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E-mail : k-razak@cheme.utm.my

Master of Science
PROCESS PLANT MANAGEMENT
Taught Course

In 2000, Institute of Bioproduct Development (IBD), in collaboration with the industry has developed an innovative M. Sc. in Process Plant Management programme. Current enrolment of 50 professionals from major industries and a total successful graduate of 40 proves that the programme is relevant and beneficial to professionals who are seeking hands-on practical knowledge whilst working. The modules incorporated in this programme have an objective of equipping professionals with skills and knowledge to become managers and hold higher ranking positions in the industry.

PROGRAMME OBJECTIVES

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

1. Engender the competencies key to successful management of complex plant operations through introduction to benchmark technologies.

2. Generate an in-depth knowledge and understanding of the technical, financial and organisational factors critical to process plant process.

3. Energise visionary, value-driven individuals who are able to sustain impetus for innovation by anticipating and capitalising upon the potential of new and emerging technologies.

4. Reinforce regard and respect for environmental and safety concepts.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

Part time:

- Consists of 12 modules (in the field of Process and Plant Technology, Business and Management) and a submission of an in-company project.

- Each module comprises of lectures and case studies to be completed within 4 days or 2 weekends.

- After each module, assignments, tests or short projects will be given to participants to be submitted within 5 weeks.

- A minimum of 3/4 weeks break will be given between each module.

- Lectures will be conducted by academicians, policymakers and industry practitioners - or professionals who provide the know-how through their hands-on industrial experience

Full time:

- This mode will only commence with minimum enrolment of 10 students.
- Minimum length of study is 3 semesters.
- Modules are similar to weekend PART-TIME programme

The candidate must complete a total of 40 credits as follows:

Process Plant Technology (Core Modules)

Introduction to Chemical Process Engineering and Industry	3 credits
Chemical Processes and Equipment	3 credits
Process Operation, Control & Troubleshooting	3 credits
Energy Management	3 credits
Environmental Management Plan	3 credits
Process Risk Management and Safety	3 credits

Business and Management (Core Modules)	
Human Factors in Industry	3 credits
Financial Analysis and Control System	3 credits
Quality Management	3 credits
Project Planning, Management and Control	3 credits
Strategic Marketing Planning and Implementation	3 credits
Elective Modules (Choose 1)	
Plant Maintenance and Inspection	3 credits
Project Economics and Feasibility Study	3 credits
In-Company project (4-month equivalent)	4 credits
Total	**40 credits**

ENTRY QUALIFICATION

- B. Eng./ B. Sc. in Chemical Engineering /Chemical Technology / Industrial Chemistry with CGPA 3.0 or equivalent; OR
- B. Eng./ B. Sc. in other Engineering disciplines or B. Sc. in Science disciplines with CGPA 3.0 or equivalent and with minimum of 2 years working experience in the Process industry; OR
- Candidates with the above qualifications but having other results can still apply if they have adequate number of years of working experience in the process industry.

For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

AWARD

UTM will award M. Sc. in Process Plant Management to candidates who satisfy the examiners in all 12 modules and satisfactorily complete the in-company project. Postgraduate Diploma in Process Plant Management will be awarded to candidates who only satisfy the examiners in 10 modules.

Programme Coordinator:
Prof. Ramlan Abdul Aziz
Office : N23A
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Master of Science
SAFETY, HEALTH AND ENVIRONMENT
Taught Course

Master of Science in Safety, Health and Environment (Taught Course) is suitable for any graduate from science, technology and engineering backgrounds. The program is currently being offered in UTM Kuala Lumpur and Skudai. Two modes of study are available, i.e. full-time (2 semesters) or part-time (4 semesters).

PROGRAMME OBJECTIVES

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

1. Apply knowledge on safety, health and environment.
2. Manage organisations and resources towards safer and healthier workplace as well as environment.
3. Conduct independent research on technical and managerial aspects of safety, health or environment.
4. Interpret local legislations to ensure compliance with safety, health and environmental requirement.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The candidate must complete a total of 40 credits as follows:

Core courses:

Safety, Health and Environmental Management	3 credits
Statistics and Research Methodology	3 credits
Human Factor and Accident Investigation	3 credits
Industrial Hygiene	3 credits
Occupational Health Management and Diseases at Workplace	3 credits

Resources Engineering	3 credits
Pollution Control	3 credits
Process Safety and Loss Prevention	3 credits
Crisis Management and Legislations in Safety, Health and Environment	3 credits
Other courses:	
General Elective	3 credits
Dissertation	10 credits
Total	**40 credits**

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in any field of science, technology and engineering with CGPA of at least 3.0/4.0 (or equivalent) from a Recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

Candidates with other academic backgrounds must have at least 5 years minimum working experience in the field of safety, health or environment.

AWARD

For the award of Master of Science (Safety, Health and Environment), the students should achieve a total minimum of 40 credit hours with minimum CPA of 3.0, including completion of the Master Project.

Programme Coordinator:
Assoc. Prof. Dr. Mohamad Wijayanuddin Ali
Office : N01-425
Phone : 07-5535602
E-mail : m.w.ali@cheme.utm.my

Master of Science
HERBAL TECHNOLOGY
Taught Course

The herbal industry offers a unique and strategic investment opportunity that resulted in its rapid growth worldwide. Thus, FKK in collaboration with Institute of Bioproduct Development (IBD) is offering Master of Science (Herbal Technology) programme, a taught course master level programme. This programme, that tackles the technological part of the development of herbal based products, is expected to meet the needs of skilled manpower in herbal industry. Being the only one of its kind in Malaysia, this programme is anticipated to contribute significantly to the development of herbal industry in Malaysia.

PROGRAMME OBJECTIVES

At the end of the programme graduates are able to:

1. Analyze critically, plan, solve complex problems associated with herbal science and technology and related fields and design plant-wide processes including unit operations leading to professional herbal qualification.

2. Communicate effectively, advocate their ideas and practice professional, ethical, environmental and societal responsibilities irrespective of different global and cultural prespectives.

3. Easily adapt to different roles, responsibilities, surroundings and communities, enabling them to contribute and lead in their organizations and society at large.

4. Be lifelong learners who are able to demonstrate business acumen and higher-order thinking skills needed to solve problems through innovation and creativity.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

This programme is offered on full-time and part-time basis. For full-time basis, it is a minimum one year programme (2 regular academic semesters and a short semester) and for part time basis, it is a minimum two year programme (4 regular academic semesters and two short semesters). Courses are assessed completely for each semester.

Candidates must complete a total of 40 credits as follows:

Core courses	
Botany and herbal chemistry	3 credits
Herbal processing	3 credits
Product formulation	3 credits
Herbal Science and technology practicals	3 credits
Management of herbal quality	3 credits
Safety aspects in herbal processing	3 credits
Track electives (Choose group A or B)	
Group A (Herbal industry)	
Herbal cosmeceuticals	3 credits
Nutraceuticals	3 credits
Functional Food	3 credits
Group B (Plant Maintenance)	
Plant Utilities	3 credits
Maintenance of machines and equipment	3 credits
Boilers, pumps and compressors	3 credits
University elective	3 credits
Master project	
Master project 1	4 credits
Master project 2	6 credits
Total	**40 credits**

ENTRY QUALIFICATION

Candidates must hold a Bachelor of Science or Bachelor of Engineering Degree in any related field from recognized Higher Learning Institution with CGPA of > 3.0/4.0. For those having CGPA less than the minimum requirement, please refer to Appendix A. International applicants from countries in which the official language is not English are required to fulfil the following minimum requirement of English efficiency: TOEFL score of 550 or IELTS band 6 or MUET band 6. Candidates who do not meet the minimum requirement must enrol in an intensive English course conducted by the university.

Candidates who hold a Bachelor Degree in fields other than science or engineering must have at least 8 years working experience in any field related to herbal industry. Candidates must also undergo an interview session and must enrol in pre-requisite courses determined by the faculty.

AWARD

Students will be awarded the degree Master of Science (Herbal technology) after accumulating a total of 40 credit hours of coursework and Master project with minimum cumulative B grade or CGPA of 3.0/4.0.

Programme Coordinator:
Assoc. Prof. Dr Azila Abdul Aziz
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E-mail : azila@cheme.utm.my

Engineering Doctorate
PROCESS PLANT MANAGEMENT
Taught Course

The Eng. D. programme is a radical alternative to the traditional Ph.D. being better suited to the needs of the industry and provides more vocationally oriented doctorates in the process industry. It is highly flexible and able to accommodate candidates from all level of management. It is a full-time postgraduate programme where candidates are expected to spend most of their time carrying out research works at their organisations or industries.

PROGRAMME OBJECTIVES

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

1. Graduates are able to create new knowledge and recommend innovation in the application of knowledge of process plant management.
2. Graduates are able to initiate and solve issues related to process plant management.
3. Graduates are able to demonstrate findings through communication skills effectively and to display the ability to work in a team.
4. Graduates are able to practice professional ethics in research projects that related with process plant management.
5. Graduates are able to practice the knowledge on business, management, process and plant technology.
6. Graduates are able to create financial and business opportunity in process plant management.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

- The Eng. D. programme is overseen by the EngD. Programme Committee. The duration of the study depends on the entry qualification of the candidate.
- The minimum duration of study for candidates with a Master degree in appropriate fields is six (6) semesters.
- All candidates are required to complete the taught modules, with a minimum of 15 credits.
- The research work can only be undertaken after the student has completed the taught course module requirements.
- The research progress of a student is assessed semesterly through a progress report.

The candidate must complete a total of 108 credits as follows:

University course	
Quantitative Analysis	3 credits
Research Methodology (compulsory attendance)	
Process and Plant Technology (choose 2 modules)	
Building Operational Excellence in the Process Industry	3 credits
Batch Process Modeling, Scheduling and Optimisation	3 credits
Plant Shutdown, Turnaround and Debottlenecking	3 credits
Strategic Plant Reliability Management	3 credits
Business and Management (choose 2 modules)	
Business Strategy and Strategic Management	3 credits
Financial Decision Making	3 credits
Management of Change	3 credits
Logistics and Operation Management	3 credits)
Dissertation	
Doctoral Research Project	93 credits
Total credits	**108 credits**

ENTRY QUALIFICATION

- M.Sc. in Process Plant Management from Universiti Teknologi Malaysia.; OR
- Master of Engineering or Science from Universiti Teknologi Malaysia or any other higher learning institution approved by the Senate. OR
- Other qualifications equivalent to a Master' Degree with relevant working experience approved by the Senate

AWARD

UTM will award EngD. in Process Plant Management to candidates who satisfy the examiners in all 5 modules and satisfactorily complete the dissertation.

Programme Coordinator:
Prof. Ramlan Abdul Aziz
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Doctor of Philosophy
BIOPROCESS ENGINEERING DESIGN
Taught Course

Doctor of Philosophy in Bioprocess Engineering Design is a taught course doctoral programme that emphasizes on developing the capability of the graduates to work within a professional context in biotechnology-related industries. The programme is expected to meet the needs of skilled manpower in Bioprocess Engineering Design. This programme is part of the collaboration between UTM with Delft University of Technology (TUD), Netherlands.

The structure of Doctor of Philosophy in Bioprocess Engineering Design is a hybrid between course work and project design. Trainees need to take 56 credit hours-worth of coursework. Thereafter they will be placed in industry for one year where they will be solving actual design problem worth 40 credit hours. During this time, they will be supervised by supervisors from UTM and industry.

Overall, the trainees have to enrol in courses that are divided into the following parts:

i. Equalization
ii. Broadening
iii. Deepening
iv. Group design project
v. Individual design project

PROGRAMME OBJECTIVES

Graduates are able to:

: analyze critically, plan and solve complex problems associated with bioprocess engineering and related fields and design plant-wide processes including unit operations leading to professional engineering qualification.

: communicate effectively, advocate their ideas and practice professional, ethical, environmental and societal responsibilities irrespective of different global and cultural prespectives.

: easily adapt to different roles, responsibilities, surroundings and communities, enabling them to contribute and lead in their organizations and society at large.

: be lifelong learners who are able to demonstrate business acumen and higher-order thinking skills needed to solve problems through innovation and creativity.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

This programme is offered on full-time and part-time basis and is based on a 2-Semester Academic Year. The short semester is optional but can also be used to offer courses for students to prepare for the final completion of their programme. Courses are assessed completely for each semester. Full time programme will run for 2 ½ Academic Years and part time programme will run for 4 Academic Years.

The candidate must complete a total of 96 credits as follows:

University elective	3 credits
Equalization courses	
Chemical Engineering Thermodynamics	3 credits
Transport Processes	3 credits
Numerical Methods in Chemical Engineering	3 credits
Bioreactor Analysis and Design	3 credits
Bio separation	3 credits
Molecular Biology and Genetic Engineering	3 credits
Broadening courses	
Molecular Transport Phenomena	3 credits
Biochemical Engineering Thermodynamics	3 credits
Sustainable Technology	3 credits
Economic Evaluations of Project	3 credits
Project Management and Ethics And Regulations in Biotechnology	3 credits
Deepening courses	
Advanced Bioreactor Analysis and Design	3 credits
Advanced Bioseparation	3 credits
Phytochemical Processing and Plant Design	3 credits
Advanced Principles of Conceptual Process Design	3 credits
Group design project	5 credits

Individual design project	
Bioprocess Engineering Design 1	20 credits
Bioprocess Engineering Design 2	20 credits
Programme elective	3 credits
Total	**96 credits**

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in any field of science, technology and engineering from recognized Higher Learning Institution AND Master of Science in any field. International applicants from countries in which the official language is not English are required to fulfil the following minimum requirement of English efficiency: TOEFL score of 550 or IELTS band 6 or MUET band 6. Candidates who do not meet the minimum requirement must enrol in an intensive English course conducted by the university.

AWARD

Students will be awarded the degree Doctor of Philosophy (Bioprocess Engineering Design) after:

• accumulating a total of 56 credit hours of coursework with minimum cumulative B grade or CGPA of 3.0

AND

• conducting individual design projects and have submitted the approved final project reports to UTM.

Programme Coordinator:

Assoc. Prof. Dr Azila Abd. Aziz
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E-mail :azila@cheme.utm.my
:azila@ibd.utm.my

Master of Engineering CHEMICAL by research

Master by research in Chemical Engineering is suitable for any graduate from science, technology and engineering courses. Graduates from other disciplines but with relevant experiences are also encouraged to apply. Depending on the candidate's background, pre-requisite subjects may be imposed by supervisor to assist the candidate to comprehend more in-depth chemical engineering research.

PRGRAM OBJECTIVES

The objectives of this programme are to:

1. Enable graduates to in-depth knowledge in chemical engineering-related areas.
2. Produce graduates who can independently design and manage project.
3. Produce graduates who can formulate and solve problems through effective thinking skills
4. Enable graduates to articulate their ideas and findings through oral presentation and scientific writing.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Minimum 3 semesters (6 semesters) (FULL-TIME)
Minimum 4 semesters (10 semesters) (PART-TIME)

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in Chemical Engineering from Recognised Higher Learning Institution or Bachelor Degree in other engineering or science disciplines with CGPA ≥ 3.0 or equivalent. For CGPA < 3.0, work experience is needed. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

AWARD

For the award of Master of Engineering (Chemical), the students should complete the Master Thesis and pass oral examination (viva).

Programme Coordinator :
Assoc. Prof. Dr. Norasikin Othman
Office : N01-259
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E-mail : norasikin@cheme.utm.my

Master of Engineering
ENVIROMENTAL
by research

The master programme in environmental engineering is designed to prepare the candidates for successful and dynamic careers in the continuously expanding field of environmental engineering. In a rapidly changing and increasingly interconnected world, pollution problems have brought about increased individual and public awareness. Environmental engineering has expanded rapidly to include areas such as water and air pollution, groundwater contamination, solid and hazardous waste management, and industrial waste treatment. A wide array of employment opportunities exists for environmental engineers in federal, state and local government as well as in the industrial and private sectors.

PROGRAMME OBJECTIVES

The objectives of this programme are to:

1. Enable graduates to apply in-depth knowledge in environmental engineering-related areas.
2. Produce graduates who can independently design and manage project.
3. Produce graduates who can formulate and solve problem through effective thinking skills
4. Enable graduates to articulate their ideas and findings through oral presentation and scientific writing.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time mode with a specific subject being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 3 semesters and maximum 6 semesters
Part time: Minimum 4 semesters and maximum 10 semesters

The candidate must complete:

University Elective	3 credits
Research (Minimum 3 semesters)	
Research Methodology (compulsory attendance)	

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in any field of science, technology and engineering with CGPA of at least 3.0/4.0 (or equivalent) from a Recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

AWARD

For the award of Master of Engineering (Environmental), the students must complete the Master Thesis and pass oral examination (viva).

Programme Coordinator:
Dr. Anwar Johari
Office :N01-247
Phone :+607-553 5554 (office)
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Master of Engineering BIOPROCESS by research

Master by research in Bioprocess Engineering is suitable for any graduate from science, technology and engineering programs. Graduates from other disciplines but with relevant experiences are also encouraged to apply. Depending on the candidate's background, pre-requisite subjects may be imposed by supervisor to assist the candidate to comprehend more in-depth bioprocess engineering research.

PROGRAMME OBJECTIVES

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

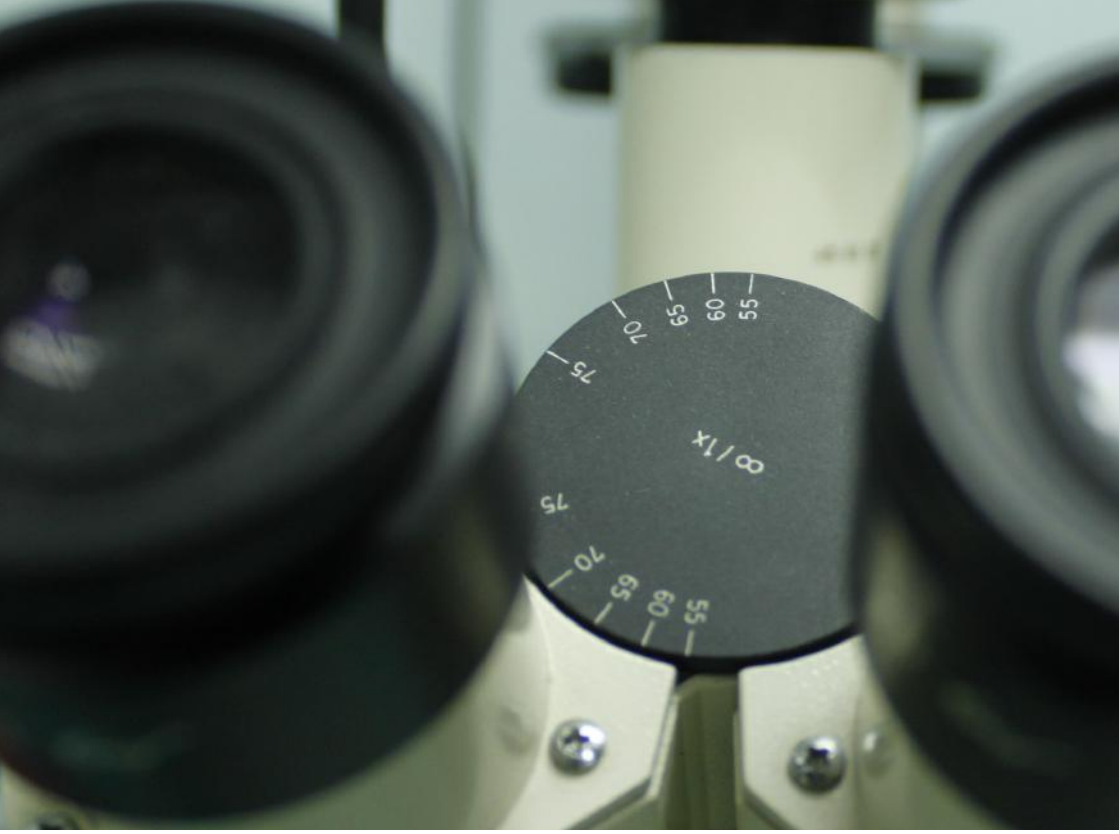
1. Incorporate in-depth relevant knowledge in professional practices for the benefits of both national and international communities.
2. Manage conducive working environment qualities through effective leadership, problem solving and higher order thinking skills.
3. Apply a wide range of relevant knowledge through effective oral and written communications.
4. Adopt the latest relevant knowledge and cutting-edge technologies through life-long learning process.
5. Balance professional and ethical responsibilities including contemporary issues and environmental awareness.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 3 semesters and maximum 6 semesters
Part time: Minimum 4 semesters and maximum 10 semesters

The candidate must complete:
University Elective 3 credits
Research (Minimum 3 semesters)
Research Methodology (compulsory attendance)



ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in Chemical Engineering or Chemical Engineering (Bioprocess) or with CGPA of at least 3.0/4.0 from a Recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to the Appendix A.

Candidates holding a Bachelor Degree in other engineering or science disciplines may also apply but are required to take some pre-requisite courses.

AWARD

For the award of Master of Engineering (Bioprocess), the students must complete the Master Thesis and pass oral examination (viva).

Programme Coordinator:
Dr. Roslina Rashid
Office : N01-250
Phone : 07-5535477
E-mail : roslina@cheme.utm.my

Master of Engineering POLYMER by research

PROGRAMME OBJECTIVES

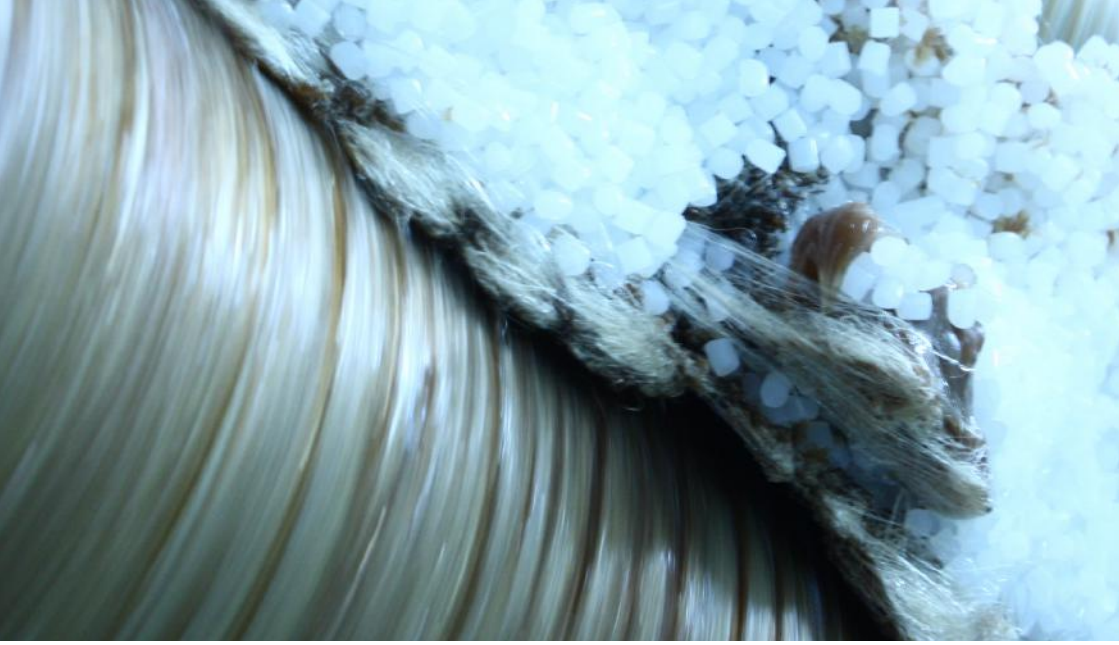
At the end of the programme, the candidate will be able to:

1. Practice in-depth knowledge and skills of polymer technology and related fields.
2. Develop research for knowledge enhancement in the area of polymer technology.
3. Demonstrate effective communication skills to a wide variety of audiences and practice professional, ethical, environmental and societal responsibilities, and tolerate/value different global and cultural perspectives.
4. Show adaptability in different roles, responsibilities, surroundings and communities, enabling them to contribute and lead in their organiszations and society.
5. Demonstrate business acumen and higher-order thinking skills necessary to solve problems through innovation and creativity which also drive them to be lifelong learners.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time mode with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 3 semesters and maximum 6 semesters
Part time: Minimum 4 semesters and maximum 10 semesters



The candidate must complete:

University Elective	3 credits
Research (Minimum 3 semesters)	
Research Methodology (compulsory attendance)	

ENTRY QUALIFICATION

Candidate must hold a Bachelor Degree in any field of science, technology and engineering with CGPA of at least 3.0/4.0 (or equivalent) from a Recognised Higher Learning Institution. For those having CGPA less than the minimum requirement, please refer to Appendix A included in this book.

Candidates not from Polymer Engineering academic backgrounds with or without working experience should take the following subject:

SKV 2513 - Introduction to Polymer Science & Engineering

AWARD

For the award of Master of Engineering (Polymer), the students must complete the Master Thesis and pass oral examination (viva).

Programme Coordinator:

Assoc. Prof. Dr. Mat Uzir Wahit
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Phone : 07-5536141
E-mail : mat.uzir@cheme.utm.my

Doctor of Philosophy
CHEMICAL ENGINEERING

PhD in Chemical Engineering is suitable for any graduate from science, technology and engineering courses. Graduates from other disciplines but with relevant experiences are also encouraged to apply. Depending on the candidate's background, pre-requisite subjects may be imposed to assist the candidate to comprehend more in-depth chemical engineering research.

PROGRAMME OBJECTIVES

The objectives of this programme are to:

1. Enable graduates to apply in-depth knowledge in chemical engineering-related areas.
2. Produce graduates who can independently design and manage project.
3. Produce graduates who can formulate, solve and conduct problems through effective and critical thinking skills.
4. Enable graduates to articulate their ideas and findings through oral presentation and scientific/journal writing.
5. Enable to lead a team to complete job assignments with confidence, ethics, integrity and societal responsibilities.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Minimum 5 semesters (12 semesters) (FULL-TIME)
Minimum 8 semesters (16 semesters) (PART-TIME)

ENTRY QUALIFICATION

A Master's Degree from Universiti Teknologi Malaysia or any other Institutions of higher learning recognized by the Senate; or

Other qualifications equivalent to a Master's degree and experience in the relevant field recognized by the Senate; or

Candidates who a currently registered in a Master's Degree programme at Universiti Teknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.

Additional Requirement for Candidates : English Language

AWARD

For the award of PhD (Chemical Engineering), the students should complete the PhD Thesis and pass oral examination (viva).

Programme Coordinator :
Assoc. Prof. Dr. Norasikin Othman
Office : N01-259
Phone : 07-5535486
E-mail : norasikin@cheme.utm.my

Doctor of Philosophy
ENVIROMENTAL ENGINEERING

The doctorate programme in environmental engineering is designed to prepare the candidates for successful and dynamic careers in the continuously expanding field of environmental engineering. In a rapidly changing and increasingly interconnected world, pollution problems have brought about increased individual and public awareness. Environmental engineering has expanded rapidly to include areas such as water and air pollution, groundwater contamination, solid and hazardous waste management, and industrial waste treatment. A wide array of employment opportunities exists for environmental engineers in federal, state and local government as well as in the industrial and private sectors.

PROGRAMME OBJECTIVES

The objectives of this programme are to:

1. Enable graduates to apply in-depth knowledge in environmental engineering-related areas.
2. Produce graduates who can independently design and manage project.
3. Produce graduates who can formulate and solve problems through effective thinking skills
4. Enable graduates to articulate their ideas and findings through oral presentation and scientific writing.
5. Enable graduates to lead a team to complete job assignments with confidence, ethics, integrity and societal responsibilities.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time mode with a specific subjects being delivered and assessed in each semester . The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 6 semesters and maximum 14 semesters
Part time: Minimum 8 semesters and maximum 16 semesters

The candidate must complete:

University Elective	3 credits
Research (Minimum 6 semesters)	
Research Methodology (compulsory attendance)	

ENTRY QUALIFICATION

- A Master Degree from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or
- Other qualifications equivalent to a Master degree and experience in the relevant field recognised by the Senate; or
- Candidates who are currently registered in a Master Degree programme at Universiti Teknologi Malaysia, and approved by FChE Graduate Studies Committee and the Senate.
- Additional requirement for candidates : English Language

AWARD

For the award of Doctor of Philosophy (Environmental Engineering), the students should submit PhD thesis and pass oral examination (viva).

Programme Coordinator:
Dr. Anwar Johari
Office :N01-247
Phone :+607-553 5554 (office)
E-mail :anwar@cheme.utm.my

Doctor of Philosophy
BIOPROCESS ENGINEERING

PhD in Bioprocess Engineering is suitable for any graduate from science, technology and engineering programs. Graduates from other disciplines but with relevant experiences are also encouraged to apply. Depending on the candidate's background, pre-requisite subjects may be imposed to assist the candidate to comprehend more in-depth bioprocess engineering research.

PROGRAMME OBJECTIVES

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

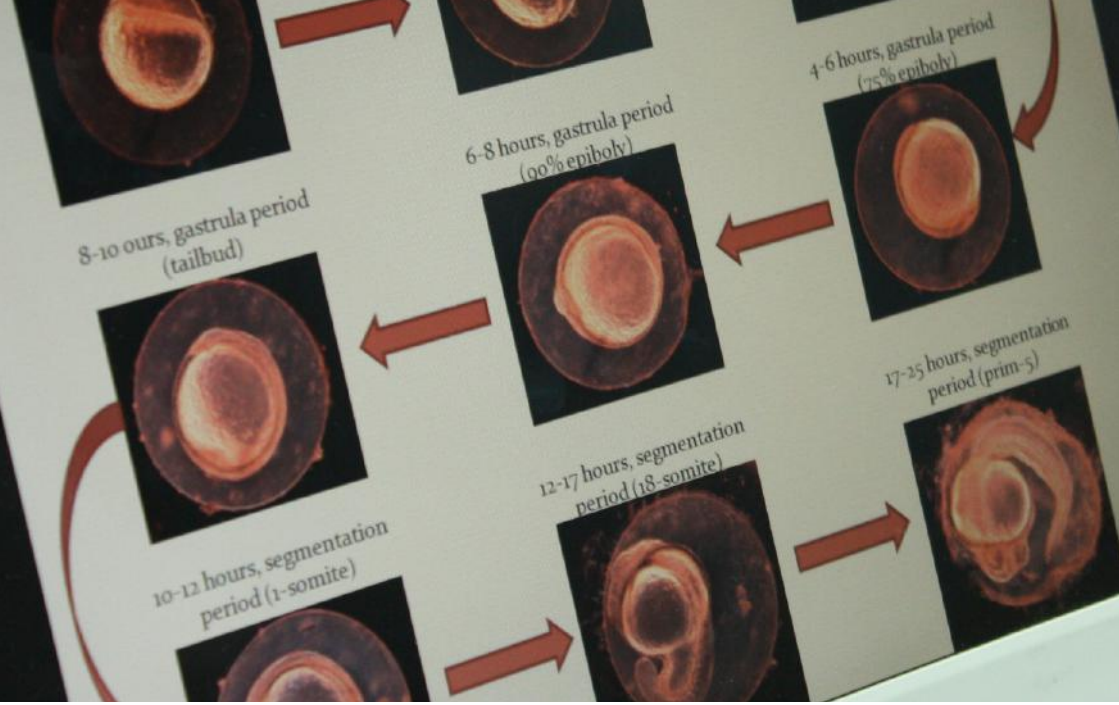
1. Generate in-depth relevant knowledge in professional practices for the benefits of both national and international communities.
2. Maintain conducive working environment qualities through effective leadership, problem solving and high order thinking skills.
3. Advocate relevant knowledge and expertise through effective oral and written communications.
4. Develop relevant niche knowledge and cutting-edge technologies.
5. Nurture, promote professional and ethical responsibilities including contemporary issues and environmental awareness.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time mode with a specific subjects being delivered and assessed in each semester . The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 6 semesters and maximum 14 semesters
Part time: Minimum 8 semesters and maximum 16 semesters

The candidate must complete:
University Elective 3 credits
Research (Minimum 6 semesters)
Research Methodology (compulsory attendance)



ENTRY QUALIFICATION

A Master's Degree from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or

Other qualifications equivalent to a Master's degree and experience in the relevant field recognised by the Senate; or

Candidates who a currently registered in a Master's Degree programme at Universiti Teknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.

Additional Requirement for Candidates : English Language

AWARD

For the award of Doctor of Philosophy (Bioprocess Engineering), the students should submit PhD thesis and pass oral examination (viva).

Programme Coordinator:
Dr. Roslina Rashid
Office : N01-250
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E-mail : roslina@cheme.utm.my

Doctor of Philosophy
POLYMER ENGINEERING

PROGRAMME OBJECTIVES

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

1. Generate in-depth knowledge in professional practices for the benefits of both national and international communities.
2. Develop niche knowledge and cutting-edge technologies.
3. Nurture and promote professional and ethical responsibilities including contemporary issues, safety and environmental awareness.
4. Maintain conducive working environment qualities through effective leadership, problem solving and high order thinking skills.
5. Advocate technical knowledge and expertise through effective oral and written communications.

PROGRAMME FORMAT (FULL-TIME & PART-TIME)

The course is offered in full-time and part-time mode with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

Full time: Minimum 6 semesters and maximum 14 semesters
Part time: Minimum 8 semesters and maximum 16 semesters

The candidate must complete:
University Elective 3 credits
Research (Minimum 6 semesters)
Research Methodology (compulsory attendance)

ENTRY QUALIFICATION

- A Master Degree from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or
- Other qualifications equivalent to a Master degree and experience in relevant fields recognised by the Senate; or
- Candidates who are currently registered in a Master Degree programme at Universiti Teknologi Malaysia, and approved by the FChE Graduate Studies Committee and the Senate.
- Additional requirement for candidates : English Language

AWARD

For the award of Doctor of Philosophy (Chemical Engineering), the students should submit PhD thesis and pass oral examination (viva).

Programme Coordinator:
Assoc. Prof. Dr. Mat Uzir Wahit
Office : N01-319
Phone : 07-5536141
E-mail : mat.uzir@cheme.utm.my

Appendix A

EVALUATION GUIDELINES
ADMISSION REQUIREMENT 1998 Pind. 1/2008

BIL	QUALIFICATION	OTHERS IPT	INTERNATIONAL UNIVERSITY GRADUATE
1)	First Class Second Class Upper (II : I) CPA 4.00 : ≥ 3.00 Score 20 : ≥ 15 CPA 5.00 : ≥ 3.75 Marks 100 (%) : ≥ 75 % Marks 1000 : ≥ 750 Excellent Pass	No Experience	-No Experience -JPA Recognization*
2)	Second Class Lower (II : II) CPA 4.00 : 2.70 ≤ CPA < 3.00 Score 20 : 13.5 ≤ CPA < 15 CPA 5.00 : 3.38 ≤ CPA < 3.75 Marks 100 (%) : 67.5 % ≤ CPA < 75% Marks 1000 : 675 ≤CPA < 750 Very Good Pass	2 years working experience in related field	-1 year working experience in related field -JPA Recognization*
3)	Second Class Lower (II : II) CPA 4.00 : 2.50 ≤ CPA < 2.70 Score 20 : 12.5 ≤ CPA < 13.5 CPA 5.00 : 3.13 ≤ CPA < 3.38 Marks 100(%) : 62.5 % ≤ CPA < 67.5% Marks 1000 : 625 ≤CPA < 675 Good Pass	4 years working experience in related field	-3years experience. -JPA Recognization*
4)	Second Class Lower (II : II) CPA 4.00 : 2.30 ≤ CPA < 2.50 Score 20 : 11.5 ≤ CPA < 12.5 CPA 5.00 : 2.88 ≤ CPA < 3.13 Marks 100(%) : 57.5 % ≤ CPA < 62.5% Marks 1000 : 575 ≤CPA < 625 Pass	6 years working experience in related field	-5years experience -JPA Recognization *

*** According - ATTEND BACHELOR DEGREE WITH SUCCESS.**

FCHE MANAGEMENT TEAM

FROM LEFT: WIJAY, SAHAR, SHAHRIR, RAMLI, ADIBAH, SHASHA, ZAIN, IDA, HELLY, ADNAN, DR G

UTM
UNIVERSITI TEKNOLOGI MALAYSIA
RESEARCH UNIVERSITY

PG

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