Programme With Thesis
Faculty of Engineering

www.eng.upm.edu.my

The Department of Engineering:
Aerospace, Biological and Agricultural, Computer and Communication, Chemical and Environmental, Civil, Electrical and Electronics, Mechanical and Manufacturing and Process and Food
Aerospace Engineering

This field of study covers research in astrodynamics, aerodynamics, propulsion, thermo-fluids, heat transfer, materials and structures, intelligent systems, condition monitoring of aerospace structures, avionics, communication satellites, aircraft design, aerospace control systems, automatic flight control and vibration control systems.

Agricultural Mechanisation and Automation

This field of study emphasises research on agricultural mechanisation systems and models in the agriculture and plantation sectors. Design and application of automation includes application of computers, controllers, sensors, remote sensing, GIS, GPS and mechatronics in agriculture and plantation-based industries. Topics include advanced machinery design and development in bioproduction robots, harvesters, planters, chemical sprayers and other agricultural implements for plantation and agricultural field operations, and impact of design of controllers and automated systems used in bioproduction and greenhouses. Research also emphasises on the machine vision systems, sensing elements, autonomous travelling devices, master slave tractor, field server, control algorithm, soil conductivity yield mapping, soil mapping and variable rate technology, automatic water blending, soil structure detection and prediction, soil tractability for the application of smart farming and precision farming. Other research topics include robotic engineering (automation, navigation, swarm and assistive).

Agricultural Waste Engineering

This field of study will enrich students’ research skills through the application of scientific knowledge and engineering technology related to the efficient management of agricultural waste. Research will focus on the aspect of engineering knowledge to minimise the adverse impact of agricultural wastes on the environment, groundwater and public health, and to make use of the agricultural waste as by-products, as raw materials for new products, or as bio-sources of energy production. The main aim is to achieve integrated local recycling and reuse of agricultural waste, i.e. for environmental protection, energy development, fertiliser production, and water saving. It is hoped that the outcome of this research will bring about economic and social benefits as well as environmentally friendly technology and systems. This area of research also covers wastewater treatment and disposal, water pollution control, water recycling technology, water quality, air quality control, and solid waste management.

Agricultural Process Engineering

This field of study emphasises on the application of engineering principles and practices for post harvest operations, preservations and processing of agricultural and bioresource materials processes so that they are efficiently utilized and losses are minimized. The area covers primary processing, preservation and storage of major agricultural commodities such as grains, oil palm, cocoa, fruits, vegetables, flowers and herbal materials through designing, developing and applying chemical and physical unit operations such as separation, extraction, purification, extrusion, drying, packaging, milling, heating and refrigeration. Emphasis is also given on the utilization of agricultural/biological materials to develop new bio-based raw materials for food, nutraceutical and manufacturing materials.

Automotive Engineering

The field of Automotive Engineering includes basic and applied research studies in the development and design of automotive technology usage, automotive system and components. It includes fuel storage system, control system, structural design communication and vehicle integration, combustion and pollution. Fuel storage systems focus on fibre circumference composite tank, active carbon and carbon nano tube absorption system and flexible tank. Automotive control systems focus on design, development and fabrication of electronic based control engine systems. This includes smart electronic control unit design, diagnostic kit development, combustion control parameter, algorithm communication development, and calibration and usage systems. Structural design and vehicle integration include design and development of body structure and vehicle platform. This will focus on the structural design, simple design, crash analysis, stress, fatigue and vibration, ergonomic design, composite material and system integration. In the study of combustion and pollution, the focus is on research in pollution, system and component of pollution control, and energy efficient fuel combustion systems.

Biochemical Engineering

This field of study emphasises the application of chemical engineering fundamentals on living systems and biological materials such as microbes, cells, enzymes, proteins, nucleic acids, carbohydrates, oils and fats. It involves the designing and development of biological processes and unit operations starting from raw materials preparation until product purification. It also covers bioreaction, fermentation, biopolymer, biogas, composting, bioseparation, plant and animal cell culture, and biotransformation. Applications are seen in the pharmaceutical, nutraceutical, food, biomaterial, agricultural, environmental, biological wastewater treatment, bioremediation and bioenergy industries.

Biomedical Engineering

This field emphasises research in medical imaging, implant design, medical instrumentation, biomechanics and related innovation that enable students to use engineering principals to solve biological and medical problems. This is an emerging field of study that involves other disciplines and draws expertise from them.
Chemical Engineering

This field of study emphasises research on computational techniques related to finite difference, finite volume, and finite element methods, as well as development of new computational techniques for the various engineering disciplines.

Chemical Engineering

This field of study emphasises the fundamental principles of chemical engineering. Research in the field includes design, control, operation, optimisation and kinetics of chemical processes. Process integration, process safety, plant management, and related applications of advanced computation engineering are also covered. The fundamentals of science and engineering are exploited and integrated to invent and formulate novel, sustainable, renewable and biodegradable products. The chemical and process industries covered are petrochemical, oil and gas production, mineral and advanced material processing, food processing, pharmaceutical, nutraceutical and bioproduct processing.

Computer and Embedded Systems Engineering

This field places emphasis on research and courses that pertain to the latest and advanced issues in real-time systems, operating systems, firmware, data acquisition, computer architecture, memory systems, embedded systems, robotics, parallel and concurrent hardware, peripherals interfacing, computer security, biometrics, distributed computing, software engineering, and SoC and NoC.

Control System Engineering

This field of study includes topics in multivariable control systems, computer control system, system modelling and simulation process, process control, robust and optimum control, robotics, automation, real time systems, expert systems, testing and reliability engineering.

Environmental Engineering

This field of study emphasises the application of technologies for the enhancement of the environment for the good of humankind. It also provides students with a strong background in the fundamentals of environmental engineering and environmental management, and with skills to develop solutions to environmental problems which typically involve a complex blend of technical, regulatory, social, and management challenges. It covers analysis of and design for water treatment and distribution systems, wastewater and solid waste management, treatment and recovery, quality control, and pollution control and treatment. ‘Waste to wealth’ and ‘zero waste’ concepts are emphasized.

Electrical Power Engineering

This field of study includes topics in industrial drive and control, power system analysis, power electronics, power generation and operation, protective relaying, high voltage engineering, lightning protection, electromagnetic compatibility, power system stability, power converters, electrical machine design, power system modeling and identification, power system control, and end-user technologies.

Electronic Engineering

This field of study offers a selection of topics in the broad field of electronic systems, the design of silicon integrated circuit and systems particularly with the challenge of VLSI, and the design and development of sensors and instrumentations. Topics to be covered include, but not limited to, Sensors, MEMS, VLSI Design Techniques, Design for Testability, Electronic Processes in Device Semiconductors, Digital Signal Processing, computer aided control system, sensor design and applications, design of microprocessor-based systems, and artificial control systems.

Farm Structures

This field of study emphasises research on appropriate structures for agricultural machinery and implements, structures for the storage of agricultural produce, structures for animal husbandry, structures where the environment is specifically controlled to enhance animal comfort and increase productivity in agricultural practices. For the controlled environment structures, research is needed where mechanisms for controlling the environment with special needs are desired. Design and application of automation include the use of computers, controllers and sensors to enhance lighting requirements, temperature controls, and automated water requirements control. Other areas of research interest include semi-mechanically controlled environment structures, cooling systems for naturally ventilated tropical greenhouse, fertigation system for temperate crop production, mechanised systems for production in greenhouses, emerging technologies in controlled environment production systems, etc.
Food Engineering

This field of study emphasises on the application of process engineering principles and concept of food processing operations. The area covers Food Engineering properties, process design, process modeling, simulation and control, cleaning of food process plant; designing of cost-effective food process machinery, developing of food products and value-added food products, and developing of new technologies on thermal and non-thermal processing of foods.

Geographic Information System (GIS)

The postgraduate programme in Geographic Information System (GIS) focuses on the integration of hardware, software for capturing, managing, manipulating, analysing, and displaying all forms of geographically referenced information (spatial) data and the utilisation of a GIS that reveals relationships. This field covers GIS concepts including spatial data structures, data sources and transfer methods, projections and coordinate systems, georeferencing, metadata, supporting software, global positioning systems, the acquisition and compilation of data from maps, field surveys, aerial photographs and satellite images, the integration of remote sensing and GIS, as well as fundamental and advanced spatial analysis techniques such as overlay, extraction, and interpolation, etc. The area of research also covers integration of satellite technology and GIS for various multi-disciplinary earth observation applications in disaster modeling, environmental applications, marine and coastal applications, natural resources and urban development applications.

Geotechnical and Geological Engineering

This field of study deals with the engineering aspects and behaviour of soils and rocks, and their applications in engineering structures. Course and research topics include foundation design, slope stability, ground improvement, and basic engineering properties of soil and rock. Geo-environmental issues such as soil erosion, sanitary landfill, contaminated ground and toxic waste disposal are also covered.

Geospatial Engineering

The postgraduate program in Geospatial Engineering focuses on research in geospatial information acquisition, analysis, modeling, visualisation and applications. This includes the design, development, and operation of systems for collecting, analysing, and utilising geospatial information about the land, the oceans, infrastructure, natural resources, and the environment. Topics focused on include data acquisition, surveying, photogrammetry, global navigation satellite system (GNSS), location-based services (LBS), laser scanning, cartography, hydrography, and land information management.

Highway and Transportation Engineering

This field of study covers advanced knowledge in topics related to transportation, pavement and road safety engineering through a combination of lectures and research. Research topics include road accident modeling, motorcycle traffic sciences and operations, public transport operation and pavement analysis.
Industrial Engineering

This field of study places emphasis on the design, improvement and installation of integrated systems of people, material, information, equipment and energy. It draws upon specialised knowledge and skills in the mathematical, physical and social sciences, together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results obtained from such systems.

Materials Engineering

This field of study emphasises the application of material engineering principles and concepts for the design and development of materials for industrial application. Investigation on the chemical, physical and mechanical properties of materials is vital in order to understand how a material can be used and why it could fail. The materials studied include polymer, metal, ceramic, composite and other emerging materials. Also studied are advanced materials developed based on nanotechnology, material synthesis and characterisation, tribology, surface science and catalysis, failure design, forensic materials engineering, and new processing technologies, which may lead to future applications in the fields of aerospace, automotives, electronics, coatings, sensors, actuators, drug delivery, metallurgy, crystallography, metallography and drilling fluid.

Manufacturing Systems Engineering

This field of study provides students with the ability to design and analyse efficient manufacturing systems such as fabrication, assembly, testing system, etc., by optimising the use of available resources including materials, labour, machine tools, process and control devices, and their integration into production facilities.

Mechanical Engineering

This field of study places emphasis on research and courses that cover advanced thermo and fluid dynamics, energy and combustion systems, vibration, power, solid mechanics, heat transfer, and other applied mechanics.

Project Management

This field of study deals with construction projects or manufacturing management methods. The focus is on project management characteristics, systematic thinking, phases in project life cycle, project organization, planning, scheduling, monitoring and controlling, and contract administration.

Photonics Engineering

This field places emphasis on research and courses that pertain to issues in optical communications from the perspective of the physical and data link layers. The main issues include optical transmissions (coding, modulation, multiplexing, propagation), security, and access technologies at the optical frequencies. Studies on materials and devices are also included.

Packaging Engineering

This field of study emphasises the elements of packaging and the engineering principles involved in the design, fabrication and testing of packages. Studies on the properties of packaging materials form an important part in producing successful package designs. The area also includes evaluation of package suitability for the intended content and the fundamentals of packaging dynamics.
Remote Sensing

The postgraduate programme in Remote Sensing focuses on remote sensing technology, data acquisition and measurement, processing and analysis of digital images, utilisation of new techniques, and remote sensing applications.

Safety, Health And Emergency Management

Safety, health and environment (SHE) is a multi-disciplined field of study which draws input from various fields of engineering in improving the aspects of safety and health of workers, and the community, as well as the quality of our natural environment. It covers various aspects of natural eco-system, and human activities and settings. Typical settings include small- and medium-sized industries, agricultural activities, bio-systems, work place, ergonomic interventions, mental stress reduction, and physical as well as psychosocial environments. This field of study also covers the evaluation of hazards, risks, and the effectiveness and the ethical aspects of response to crises and disasters. This field of study also involves the design for safe handling of industrial chemicals, disaster management, emergency plan and response to natural and man-made disasters, industrial safety, health and environment management, hazard analysis, process safety and loss prevention and occupational health safety. Research areas in SHE cover various types of human activities such as manufacturing, processing and related industries.

Soil And Water Engineering

This field is also known as soil and water resources engineering. Engineering aids the conservation of these two resources through research on the interaction between soils, plants, and water, such as the way these resources are used in the planning of irrigation and drainage systems, soil and water conservation, as well as agricultural production facilities. With the application of tools such as artificial intelligence, remote sensing, and GIS modeling, systems are designed to solve problems related to soil and water that affect the agricultural communities. Research on irrigation and drainage projects in the agricultural landscaping industry and recreational parks require the use of information engineering, automation, remote sensing and GIS. Research is focused on coming up with better solutions to problems in land and water resources development, and management of irrigation and drainage systems; as well as on methods to reduce and control erosion and sedimentation, and methods to reduce and control pollution of streams, rivers and lakes, and methods for water treatment. Relevant issues include increasing productivity through irrigation and drainage system design and management, control of soil erosion and sedimentation, water quality and quantity, geospatial information system, and non-point source pollution control.

Structural Engineering

This field of study deals with the analysis and design of structures, civil engineering materials, method of construction and industrialised building systems. Specific research topics include high performance concrete, alternative construction materials, computational mechanics, structural dynamics, seismic response, analysis, design, evaluation and vulnerability assessment, retrofitting of structures, affordable housing design, and bridge assessment.

Signal Processing

This field places emphasis on research and courses that pertain to the latest and advanced issues in the broad areas of signal processing that can be in the form of image, speech, audio and video signals, virtual reality, remote sensing, motion estimation, codec, vision systems, medical imaging and visualisation.

Water Resources Engineering

This field of study deals with the analysis, design and management of water resources systems. Related research topics include vegetated waterways, methods of river banks stabilisation, stormwater runoff management, as well as hydraulic and hydrologic modeling.

Wireless Communications and Networks Engineering

This field places emphasis on research and courses which pertain to issues in wireless and network communications from the perspective of physical and data link layers. The main issues include transmissions (coding, modulation, multiplexing, propagation), and security and access technologies at RF and microwave frequencies. Studies on materials and devices are also included.
**Doctor of Philosophy Program**

**Entry Requirement**
Bachelor Degree in Engineering with CGPA 3.75; or
Master Degree in Engineering (with thesis); or
Master Degree in Engineering (with thesis and coursework) with CGPA 3.00; or
Master Degree in Engineering without thesis (coursework) with CGPA 3.25; or
Master Degree in Engineering without thesis (coursework) with CGPA 3.00 and at least three (3) years working experience in relevant field; or
Master Degree in Sciences (with thesis and coursework) with CGPA 3.50; or
Master Degree in Sciences without thesis (coursework) with CGPA 3.50; or
Master Degree in Sciences without thesis (coursework) with CGPA 3.25 and at least three (3) years working experience in relevant field; or
Master Degree in Sciences without thesis (coursework) with CGPA 3.00 and at least five (5) years working experience in relevant field.

**Master with Thesis Program**

**Entry Requirement**
Bachelor Degree in Engineering with CGPA 3.00; or
Bachelor Degree in Engineering with CGPA 2.75 and at least three (3) years working experience in relevant field; or
Bachelor Degree in Science with CGPA 3.00 and at least five (5) years working experience in relevant field.

**Language Requirement**
- A Malaysian candidate must have obtained at least a credit in English at Sijil Pelajaran Malaysia level or have passed English courses conducted at the diploma or Bachelor’s level.
- All international candidates from countries where English is not a medium of instruction must have obtained a minimum score of 550 for TOEFL Paper-based Test (Academic Version); or Band 6.0 for IELTS (Academic Training); or 79-80 for TOEFL Internet-based Test (Academic Version).
- A candidate without requisite minimum score for TOEFL or IELTS may be granted a provisional admission. Such candidate will be required to pass an English Placement Test conducted by the University.
- A candidate who has failed the English Placement Test will be required in the first semester to pass a prescribed English Course. Should the candidate fail to obtain the prescribed minimum grade, the University may allow him to repeat the prescribed English course in the second semester.
- A candidate who has failed after the second attempt will have his candidature suspended until he passes the English course before allowed to continue with his Masters program.

**FEES : Program with Thesis (Research)**

<table>
<thead>
<tr>
<th>Cluster Science / Category</th>
<th>1st semester (pay during registration)</th>
<th>2nd – 3rd semester</th>
<th>4th semester</th>
<th>5th and subsequent semesters</th>
<th>study cost for maximum 2 years</th>
<th>study cost for maximum 3 years</th>
<th>study cost for maximum 5 years</th>
</tr>
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<tbody>
<tr>
<td><strong>LOCAL</strong></td>
<td>RM2,150.00</td>
<td>RM1,900.00</td>
<td>RM1,400.00</td>
<td>RM1,900.00</td>
<td>RM7,350.00</td>
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<td><strong>INTERNATIONAL</strong></td>
<td>RM8,600.00</td>
<td>RM15,000.00</td>
<td>RM19,150.00</td>
<td>RM27,350.00</td>
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</tbody>
</table>

1. If the thesis is submitted BEFORE the deadline, the student is required to register and pay RM400 only for the next semester.
2. If you have to resubmit your thesis, your thesis re-submission fees in **RM1, 500**.

<table>
<thead>
<tr>
<th>Cluster Science / Category</th>
<th>1st semester (pay during registration)</th>
<th>2nd - 4th semester</th>
<th>5th and 6th semester</th>
<th>7th and subsequent semesters</th>
<th>study cost for maximum 4 years</th>
<th>study cost for maximum 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCAL</strong></td>
<td>RM2,712.50</td>
<td>RM2,462.50</td>
<td>RM1,900.00</td>
<td>RM2,900.00</td>
<td>RM19,700.00</td>
<td>RM25,500.00</td>
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<tr>
<td><strong>INTERNATIONAL</strong></td>
<td>RM7,212.50</td>
<td>RM6,262.50</td>
<td>RM4,700.00</td>
<td>RM5,200.00</td>
<td>RM32,800.00</td>
<td>RM43,200.00</td>
</tr>
</tbody>
</table>

1. If the thesis is submitted BEFORE the deadline, the student is required to register and pay RM450 only for the next semester.
2. If you have to resubmit your thesis, your thesis re-submission fees in **RM2, 250**.


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Language Requirement

• A Malaysian candidate must have obtained at least a credit in English at Sijil Pelajaran Malaysia level or have passed English courses conducted at the diploma or Bachelor's level.

• All international candidates from countries where English is not a medium of instruction must have obtained a minimum score of 550 for TOEFL or band 6 for IELTS.

• An international candidate who obtains score of 500-549 for the TEOFL Paper-based test or band 5.5 for IELTS. This requirement is not applicable to candidates applying for admission into the Malay Language Studies master program.

• For candidates from countries where English is not a medium of instruction, TOEFL scores will be considered, based on the minimum score of 550.

• A candidate who obtains a minimum of 407 on the TOEFL test or band 5.5 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to obtain the prescribed minimum grade, the University may allow him to repeat the prescribed English course in the second semester.

• A candidate who obtains a minimum score of 477 on the TOEFL test or band 6.5 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the second semester.

• A candidate who obtains a minimum score of 407 on the TOEFL test or band 5.5 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the first semester.

• A candidate who obtains a minimum score of 500-549 on the TOEFL test or band 5.5 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the first semester.

• A candidate who obtains a minimum score of 600-630 on the TOEFL test or band 6 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the first semester.

• A candidate who obtains a minimum score of 670-700 on the TOEFL test or band 7 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the first semester.

• A candidate who obtains a minimum score of 800-840 on the TOEFL test or band 8 on the IELTS test may be admitted with a conditional letter of acceptance. This condition requires the candidate to repeat the prescribed English course in the first semester.

Admission Requirements

<table>
<thead>
<tr>
<th>Degree Level</th>
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<tbody>
<tr>
<td>Bachelor</td>
<td>3.000</td>
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<td>Master</td>
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<tr>
<td>PhD</td>
<td>3.000</td>
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</table>

Based on the entry requirements for PhD applicants above, management has reviewed and agreed to the designation of coursework credit as below:

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FEES:

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<tr>
<td>PhD</td>
<td>3.750</td>
</tr>
</tbody>
</table>

If you have to re-submit your thesis, your thesis re-submission fees in MYR 350.00 only for next semester.

Please apply online via [http://www.sgs.upm.edu.my](http://www.sgs.upm.edu.my) and send your application with supporting documents to the address below:

Tel. : (603) 8946 4218/4223/4228, Fax. : (603) 8943 2509/8946 4232, Email : admission@putra.upm.edu.my, Website : [http://www.sgs.upm.edu.my](http://www.sgs.upm.edu.my)