PROGRAM ENGINEERING TECHNOLOGY: BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (AGRICULTURAL SYSTEMS)

Programme Educational Objectives (PEO) for Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)

<table>
<thead>
<tr>
<th>Code</th>
<th>Programme Educational Objectives</th>
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<tbody>
<tr>
<td>PEO 01</td>
<td>Graduates competent in the application of mathematics and sciences in engineering technology in managing agricultural production and natural resources.</td>
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<tr>
<td>PEO 02</td>
<td>Graduates capable of addressing issues of ethics, safety, professionalism, cultural diversity, globalization, environmental impact, and social and economic impact in their careers.</td>
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<tr>
<td>PEO 03</td>
<td>Graduates capable of managing technology and systems including capabilities to think creatively and innovatively solve problems and communicate effectively.</td>
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<tr>
<td>PEO 04</td>
<td>Graduates who can work collaboratively, have people skills and continually engaged in lifelong learning.</td>
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Programme Outcomes (PO) for Bachelor of Mechanical Engineering Technology (Honours) (Agricultural Systems)

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>PO 01</td>
<td>Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization principles to defined and applied engineering procedures, processes, systems or methodologies;</td>
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<tr>
<td>PO 02</td>
<td>Solve broadly-defined engineering problems systematically to reach substantiated conclusions, using tools and techniques appropriate to their discipline or area of specialization;</td>
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<td>PO 03</td>
<td>Design solutions for broadly-defined engineering technology problems, and to design systems, components or processes to meet specified needs with appropriate consideration for public health and safety, as well as cultural, societal, environmental and sustainability concerns;</td>
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<td>PO 04</td>
<td>Plan and conduct experimental investigations of broadly-defined problems, using data from relevant sources;</td>
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<td>PO 05</td>
<td>Select and apply appropriate techniques, resources and modern engineering tools, with an understanding of their limitations;</td>
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<td>PO 06</td>
<td>Function effectively as individuals, and as members or leaders in diverse technical teams;</td>
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<td>PO 07</td>
<td>Communicate effectively with the engineering community and society at large;</td>
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<td>PO 08</td>
<td>Demonstrate an awareness of and consideration for societal, health, safety, legal and cultural issues and their consequent responsibilities;</td>
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<td>PO 09</td>
<td>Demonstrate an understanding of professional ethics, responsibilities and norms of engineering technology practices;</td>
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<td>PO 10</td>
<td>Demonstrate an understanding of the impact of engineering practices, taking into account the need for sustainable development;</td>
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<td>PO 11</td>
<td>Demonstrate an awareness of management, business practices and entrepreneurship; and</td>
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<td>PO 12</td>
<td>Recognize the need for professional development and to engage in independent and lifelong learning.</td>
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<td>FIRST</td>
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<tr>
<td>SEMESTER</td>
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<tr>
<td></td>
<td>PDT176/2 Computer Aided Drafting</td>
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<td></td>
<td>PDT177/2 Applied Chemistry</td>
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<td></td>
<td>PDT187/2 Agricultural Mechanics</td>
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<td></td>
<td>PDT179/3 Agricultural Economics</td>
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<td></td>
<td>PDT 180/3 Engineering Science</td>
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<td></td>
<td>PDT 185/3 Mathematics for Engineering Technology I</td>
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<tr>
<td>Common Core (15)</td>
<td>PQT 111/3 Mathematics for Engineering Technology I</td>
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<tr>
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<td>UVW 410/2 University Malay Language</td>
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<td></td>
<td>UZW XXX/1 Co-Curriculum</td>
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<tr>
<td>University Required (19)</td>
<td>UVW XXX/2 Option Subject or UUT122/2 Skill and Technology in Communication</td>
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<tr>
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<td>UZW XXX/1 Co-Curriculum</td>
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<td>UVW 312/2 English for Technical Education</td>
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<tr>
<td>Total Credit</td>
<td>18</td>
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<td>Total units for Graduation = 142</td>
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LIST OF COURSES FOR BACHELOR OF MECHANICAL ENGINEERING TECHNOLOGY (HONOURS) (AGRICULTURAL SYSTEMS):

PDT176/2
COMPUTER AIDED DRAFTING

PDT177/2
APPLIED CHEMISTRY

PDT178/2
APPLIED BIOLOGY

PDT179/3
AGRICULTURAL ECONOMICS

PDT180/3
ENGINEERING SCIENCE

PDT181/3
ENGINEERING MECHANICS

PDT182/3
ELECTRONICS APPLICATION IN AGRICULTURE

PDT183/2
AGRICULTURAL MECHANICS AND WORKSHOP TECHNOLOGY

PDT184/4
AGRICULTURAL PRODUCTION SYSTEMS

PDT276/3
MECHANICS OF MATERIAL

PDT277/3
APPLIED THERMODYNAMICS

PDT278/2
GEODETICS ENGINEERING

PDT279/4
PRINCIPLES OF AGRONOMY

PDT280/2
FUNDAMENTALS OF AGIBUSINESS ACCOUNTING AND FINANCE

PDT281/3
INSTRUMENTATIONS AND CONTROL

PDT282/3
APPLIED FLUID MECHANICS

PDT283/2
AGIBUSINESS MANAGEMENT

PDT284/2
AGRO-ECOSYSTEMS AND SUSTAINABILITY
PDT376/3
FARM POWER AND MACHINERY

PDT377/3
APPLIED HEAT AND MASS TRANSFER

PDT378/2
PRECISION AGRICULTURE TECHNOLOGY

PDT379/3
WATER RESOURCES MANAGEMENT

PDT380/3
AUTOMATIONS IN AGRICULTURAL SYSTEMS

PDT381/4
FINAL YEAR PROJECT 1

PDT382/3
CONTROLLED ENVIRONMENT AGRICULTURE

PDT383/3
RENEWABLE ENERGY

PDT384/3
FOOD TECHNOLOGY

PDT385/3
BIOMATERIAL ENGINEERING (ELECTIVE)

PDT386/3
INTEGRATED AGROSYSTEMS (ELECTIVE)

PDT476/6
FINAL YEAR PROJECT 2

PDT477/3
POST-HARVEST TECHNOLOGY

PDT478/3
AGRICULTURAL WASTE MANAGEMENT AND UTILIZATION ENGINEERING

PDT479/3
BIO-RENEWABLE SYSTEMS (ELECTIVE)

PDT480/3
FOOD PROCESSING ENGINEERING (ELECTIVE)

PDT481/3
ADVANCES IN AGROTECHNOLOGY (ELECTIVE)

PDT482/3
FOOD AND HERBAL CROP PRODUCTION TECHNOLOGY (ELECTIVE)
COURSE SYLLABUS

PDT176/2
COMPUTER AIDED DRAFTING

Course Synopsis:
This course introduces the application of drafting and modelling techniques commonly used in mechanical and civil designs computer graphics, 2-D and 3-D geometry related to drafting and design of mechanical and structural components and/or systems. The primary software used in this course is AUTODESK AutoCAD.

Course Outcomes:
1. Ability to apply basic drafting skills using computer aided drafting software.
2. Ability to construct and interpret drawings in orthographic projection.
3. Ability to construct a working drawing for an engineering product or device using a CAD system.
4. Ability to accurately interpret and construct standard engineering drawings and schematic diagram.

References:

PDT177/2
APPLIED CHEMISTRY

Course Synopsis:
The course covers pure chemistry (chemical elements, atoms and molecules), water and the fitness of environment, carbon and functional groups, structure and function of macromolecules and analytical chemistry (stoichiometric calculations and chemical equilibrium which comprises of acid base equilibrium, acid base titrations and reactions, and precipitation titrations).
Course Outcomes:

1. Ability to apply the concepts and principles of general chemistry and analytical chemistry.
2. Ability to solve the problems in chemical reactions and calculations.
3. Ability to recognise and analyze the data from various types of chemistry of life and problem solving in analytical chemistry.

References:

APPLIED BIOLOGY

Course Synopsis:

This course introduces the general concepts of biology as related to agricultural technology, the molecular and cellular aspects of living things, structure and function of plants and animals, plant and animal diversity, principles of classification and ecological relationships in organisms, and the role of genetics in organism variation and adaptation.

Course Outcomes:

1. Ability to illustrate important traits in living organisms with reference to: evolution, classification and ecology
2. Ability to interpret growth in living organisms with reference to: physiology and genetics.

References:


AGRICULTURAL ECONOMICS

Course Synopsis:

The course introduces to the study of economic principles with respect to supply-demand, finance and marketing of agricultural products related to food and fiber production with special references to Malaysian conditions and policies.

Course Outcomes:
1. Ability to apply economic development and agriculture, with specific context of Malaysia’s economy and the agriculture sector.

2. Ability to analyze consumer behavior, market supply-demand equilibrium, and elasticity.

3. Ability to analyze business behavior and market supply-demand equilibrium.

4. Ability to apply macroeconomics of agriculture with respect to international agricultural trades and exchange rates and policies.

References:


Course Synopsis:
The course covers foundations of quantity and units of measurement, vectors, particle dynamics, work, power and momentum. Additional coverage includes forces on objects and introduction to electrical circuit.

Course Outcomes:
1. Ability to analyze problems related to units of measurements, and scalar and vector quantities.
2. Ability to analyze particles in motion, energy, work, power, and momentum.
3. Ability to analyze forces acting on objects.
4. Ability to analyze basic electrical circuitry.

References:
ENGINEERING MECHANICS

Course Synopsis:
This course covers vector representation of forces, moments and static equilibrium of particles, rigid bodies, and engineering structures, analysis of external and internal forces in structures via the methods of free-body diagrams and properties of cross-sectional areas, kinematics and kinetics of system of particles and of rigid bodies in two and three-dimensional spaces covering force and acceleration, linear and angular momentum, and energy conservation.

Course Outcomes:
1. Ability to interpret the basic principles of statics and dynamics on mechanism and bodies.
2. Ability to apply the basic principles of statics and dynamics on mechanism and bodies.
3. Ability to solve problem related forces, loads, displacement, velocity and acceleration of a body or mechanism.

References:

PDT182/3

ELECTRONICS APPLICATION IN AGRICULTURE

Course Synopsis:
This course introduces basic electrical circuit theory and analogue electronics, basic DC and AC circuits and fundamental of electronic components such as operational amplifiers and semiconductor diodes.
Course Outcomes:

1. Ability to demonstrate application of the key principles of DC circuit theory including Kirchhoff’s laws of current and voltage, and rules for current and voltage division.

2. Ability to apply ideal and non-ideal operational amplifier circuits.

3. Ability to analyze simple AC series and parallel circuits using phasors and complex numbers.

References:


PDT183/2

AGRICULTURAL MECHANICS AND WORKSHOP TECHNOLOGY

Course Synopsis:

This laboratory course is designed to provide students with introductory level experiences in selected major areas of agricultural mechanics technology which may include small engine maintenance and repair, metal fabrication, concrete construction, building construction, plumbing, electrical wiring, maintenance of agricultural machinery, equipment and tractors.

Course outcomes:

1. Ability to follow safety procedures in the agricultural mechanics shop.
2. Ability to sketch drawings of simple projects, layout projects from drawings, creates a bill of materials for organizing agricultural mechanics shop projects.
3. Ability to identify tools and materials common to agricultural mechanics shop.
4. Ability to demonstrate basic shop skills common to agricultural mechanics shop through the construction of an agricultural mechanics project.

References:

AGRICULTURAL PRODUCTION SYSTEMS

Course Synopsis:
The course covers the various facets of agricultural production systems and practices, dynamism within the soil-plant-atmosphere continuum involving living organisms related to crops and fauna, components in agricultural production systems and good agricultural practices and sustainability approaches.

Course Outcomes:
1. Ability to define and interpret the basic principles and processes involved in agricultural production systems.
2. Ability to solve systems/problems related to aspects in agricultural production systems.
3. Ability to choose systems related to good agricultural practices and sustainable farming.

References:
Course Synopsis:
This course covers analysis of stresses due to various loading conditions, stresses and strains at a point, stress-strain relationships, theories of failure, energy methods, shear center, unsymmetrical bending, curved beams, torsion, and buckling problems.

Course Outcomes:
1. Ability to analyze the basic concepts of mechanics of materials in design consideration.
2. Ability to analyze stress and strain by using Mohr’s Circle and Hooke’s Law plane stress in pressure vessels and beams.
3. Ability to use the superposition method or moments-area method to analyze the deflections of beams.
4. Ability to analyze buckling and stability for Columns and in designing columns.

References:
PDT277/3

APPLIED THERMODYNAMICS

Course Synopsis:

Thermodynamics is the study of heat related to matter in motion. The First Law of Thermodynamics involves the conversion of energy from one form to another while the Second Law determines the direction of heat flow, and the availability of energy to do work. This course, covers the terminology, principles, theory, and practical application of the First and Second Law of engineering thermodynamics.

Course Outcomes:

1. Ability to discuss basic concept of thermodynamic and energy transformation in the system.
2. Ability to apply the concepts of thermodynamics systems such as processes, cycles and working fluid in engineering field.
3. Ability to solve thermodynamics system performance problem analytically.
4. Ability to analyze thermodynamics system such as steam power cycles and refrigeration cycles.

References:

GEODETICS ENGINEERING

Course Synopsis:
This course emphasizes on knowledge and skills using surveying equipments such as leveling, theodolite and GPS. Topics discussed include are traversing, tacheometry, mapping, setting out, triangulation, geometric design, vertical and horizontal alignment, and volume of earthwork.

Course Outcomes:
1. Ability to apply concepts and principles of geodetic surveying.
2. Ability to perform surveying tasks and procedures.
3. Ability to analyze data from various types of geodetics surveying.

References:
PDT279/4

PRINCIPLES OF AGRONOMY

Course Synopsis:
A foundation course in agronomy applying crop, soil, and environmental sciences in understanding agricultural systems. Topics include crop morphology and classification, soils and soil water management, mineral nutrition of crops, pest management, plant breeding, seed and grain quality and sustainable aspects of crop production.

Course Outcomes:
1. Ability to relate the science and principles of agricultural crop production systems and the importance of crops to our society.
2. Ability to apply crop production principles to crop production practices.
3. Ability to demonstrate sustainable practices for agricultural crops.

References:

PDT280/2

FUNDAMENTALS OF AGRIBUSINESS ACCOUNTING AND FINANCE

Course Synopsis:
This course covers fundamentals of the double-entry accounting cycle as it relates to partnerships and sole proprietorships operating in the agricultural sector including the use of automated accounting software the application of an agribusiness firm.

Course Outcomes:

1. Ability to apply transactions into debit and credit parts.
2. Ability to apply accounts as assets, liabilities, or owner's equity.
3. Ability to prepare and analyze a balance sheet, an income statement, and statement of owner's equity.

References:

INSTRUMENTATIONS AND CONTROL

Course Synopsis:
The course covers the general concept of instrumentation, various measuring devices, manipulation, transmission, and recording of data, measurement standards, data analysis, calibration methods and software simulation to design and solve problems in measurement and automation systems.

Course Outcomes:
1. Ability to differentiate main components in instrumentation, measurement, their integration and working principle of various measurement devices.
2. Ability to differentiate roles and features of appropriate instruments for various agricultural technology and applications.
3. Ability to solve connectivity and interfacing of different instrumentation.

References:
PDT282/3
APPLIED FLUID MECHANICS

Course Synopsis:
This course emphasizes fundamental concepts and problem-solving techniques in fluid properties, static and kinematics, control volume analysis, momentum analysis of flow system, dimensional analysis, internal flows (pipe flows), differential analysis, and external flows (lift and drag).

Course Outcomes:
1. Ability to analyze the essential parameters describing a fluid system and common devices used in measuring pressure and flow rates and turbo machineries.
2. Ability to analyze pressures, forces, and energy in fluid systems.
3. Ability to calculate pressure, forces and flow rates in dynamic fluid system.

References:
PDT283/2
AGROBUSINESS MANAGEMENT

Course Synopsis:
As farming becomes more complex and global, and that the economic pressure on farming increases, future farm managers need to be equipped with knowledge in management and business strategies. This course covers strategy, marketing, financial, operations quality, risks, human resources, and organizational management.

Course Outcomes:
1. Ability to apply various management functions to agribusiness entity.
2. Ability to analyze business process improvement using quality tools.
3. Ability to analyze time-value of money.

References:

PDT284/2
AGRO-ECOSYSTEMS AND SUSTAINABILITY

Course Synopsis:
This course discusses important components of sustainability for agrosystems which can be optimized through suitable application of engineering principles to reinforce the conventional wisdom of agrosystems production. Important engineering approaches invoking current practices and design are covered.
Course Outcomes:

1. Ability to distinguish agrosystems practices and sustainability indicators which include soil, water, biomass and waste.
2. Ability to apply and formulate mathematical model for sustainable agrosystems.
3. Ability to design components and processes of sustainable agrosystems.

References:

Course Synopsis:
The course covers the basic of machines and the importance of mechanization for various farm operations, selection of appropriate machines and its maintenance and the management of farm machineries.

Course Outcomes:
1. Ability to apply the basic principles, construction and working of farm machinery for different crops and livestocks.
2: Ability to select and assemble appropriate machinery, use, repair and maintenance.
3: Ability to manage agro machinery service centre.

References:
Course Synopsis:

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

Course Outcomes:

1. Ability to discuss mechanisms and characteristics of heat and mass transfer.
2. Ability to apply mathematical models of various heat transfer mechanisms.
3. Ability to analyze different types of heat exchangers, heat transfer coefficient for heat exchanger and energy analysis on heat exchanger.
4. Ability to analyze and calculate physical mechanism of mass transfer, the rate of mass diffusion, and simultaneous heat and mass transfer.

References:

PDT378/2

PRECISION AGRICULTURE TECHNOLOGY

Course Synopsis:

This course covers the essential aspects of Precision Agriculture (PA) concepts including soil/landscape and crop spatial variability, GIS, DEM, GPS, sensors, variable rate machinery, PA software, remote sensing; geostatistics, sampling, experimental designs, precision integrated crop management, data acquisition, processing, and management and socio-economical and e-marketing aspects.

Course Outcomes:

1. Ability to illustrate the concept, component and application of precision farming in agriculture.
2. Ability to apply spatial information and precision agriculture technologies to improve soil and crop management, environmental and socio-economical aspects.
3. Ability to analyze geo-referenced data using spatial information technologies.

References:

Course Synopsis:

This course introduces principles of surface and ground water hydrology and their applications in water resources engineering, descriptive and quantitative applications of the hydrologic cycle, weather system, precipitation, evaporation, transpiration, surface and subsurface waters, stream flow hydrographs and flood routing. The course also covers water resources management principles, regulatory issues, management of water resources for sustainable development, tools for water resources management; economic analysis, water supply, water demand, climate change and water resources management, extremes (floods and droughts), water management in the Malaysia practices and use of computer-based tools in solving water resources management problems.

Course Outcomes:

1. Ability to analyze principle of water resources, planning and management.
2. Ability to infer the components of hydrologic cycle and the affect to human daily lives.
3. Ability to analyze hydrologic data for engineering design and management.

References:

PDT380/3

AUTOMATIONS IN AGRICULTURAL SYSTEMS

Course Synopsis:
This course covers advanced study on instrumentation with emphasis on selection of measurement techniques and transducers to sense physical properties of biological materials with application to agricultural, food processing industries and biological system. Application of biosensors in agriculture, design of automation system and machine/gentry for agricultural systems.

Course Outcomes:
1. Ability to identify and apply the concepts of automated machines and equipment and to agricultural related problems.
2. Ability to operate with existing biosensor systems and transducers, as well as to design new sensors.
3. Ability to identify and assemble industrial sensors in farming system

References:
PDT381/4

FINAL YEAR PROJECT 1

Course Synopsis:

A short-term research project in engineering operations for producing agricultural systems and technologies including research writing and presentation of the research outcome in the form of thesis and seminar.

Course Outcomes:

1. Ability to apply and integrate theory and practical to solve the engineering problems.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.

References:

1. Buku Panduan Projek Tahun Akhir UniMAP

PDT382/3

CONTROLLED ENVIRONMENT AGRICULTURE

Course Synopsis:

The course covers design of controlled environment agricultural structures which include thermal and environmental engineering analyses appropriate for controlled environment agricultural production facilities for plants and animals. Major topics include psychrometrics, heat transfer, ventilation and heating, air distribution within buildings, and control systems.

Course Outcomes:

1. Ability to analyze heat and mass transfer of plants and animals structures.
2. Ability to analyze natural and forced cooling and heating for plants and animals structures.
3. Ability to analyze mechanical and natural ventilation for plants and animal structures.

References:


PDT383/3

RENEWABLE ENERGY

Course Synopsis:

The course covers the application of various energy resources to generate power useful for processing biological materials and focuses on the technology, production process and engineering of renewable sources of energy which includes solar, wind, wave, and energy from biomass.

Course Outcomes:

1. Ability to explain technologies used in generating mechanical and electrical power for biosystems

2. Ability to demonstrate the concepts of renewable energy conversion suitable for production and processing of biological materials.

3. Ability to evaluate the efficiency and performance of different renewable energy generating systems.

References:


Course Synopsis:
This course covers multidisciplinary field of food technology and related industries. Topics covered include food science, food ingredients, nutrition, nutritional information, food spoilage, food production systems, preservation processes, freezing, drying, direct-heating, radiation, extrusion and packaging, freezing, texturization, mechanical separation and food biotechnology.

Course Outcomes:
1. Ability to differentiate the principles of food technology.
2. Ability to interpret ingredients and nutrition in food.
3. Ability to solve problems involved in food production.

References:
5. Toledo, R.T. Fundamental of Food Process Engineering.
PDT385/3

BIOMATERIAL ENGINEERING (ELECTIVE)

Course Synopsis:
This course covers structure and properties of biomaterial and related solids, physical and chemical bases for properties exhibited by materials, polymeric biomaterials, metallic biomaterials, ceramic biomaterials and composite materials. Material properties including mechanical, electrical, magnetic and thermal behaviour, applications of biomaterials in agricultural systems, relationship between physical and chemical structure of materials and biological system response, selection, fabrication and modification of materials for specific applications, biomaterials processing and degradation, implant requirements, host-implants reactions including wound healing response and inflammatory response, physiological and biomechanical basis for soft-tissue implants, design of modified biomaterials, bulk and surface characterization of materials and regulatory and ethical concerns dealing with the implementation and commercialisation of biomaterials.

Course Outcomes:
1. Ability to analyze the biomaterial physical, chemical and biological properties.
2. Ability to design the processing system for a biomaterial.
3. Ability to recommend the commercialization potential of biomaterial

References:

PDT386/3

INTEGRATED AGROSYSTEMS (ELECTIVE)

Course Synopsis:
An advanced course integrating principles of crop production, animal husbandry, aquaculture, soils and environmental sciences in agricultural systems. Topics include concept and principles of biologically integrated farms, components, interactions, techniques and energy flows of integrated farms.

Course Outcomes:
1. Ability to compare and contrast between integrated farming and conventional farming.
2. Ability to categorize the components, interactions and energy flows in an integrated farming system.
3. Ability to demonstrate sustainable practices of integrated farming systems.

References:

PDT476/6

FINAL YEAR PROJECT 2

Course Synopsis:
A short-term research project in engineering operations for producing agricultural systems and technologies, including research writing and presentation of the research outcome in the form of thesis and seminar.

Course Outcomes:
1. Ability to apply and integrate theory and practical to solve the engineering problem.
2. Ability to develop suitable research methodology for the project.
3. Ability to present and defend effectively project proposal to selected audience.

4. Ability to evaluate the commercialization potential for proposed project

References:

1. Buku Panduan Projek Tahun Akhir UniMAP

PDT477/3
POST-HARVEST TECHNOLOGY

Course Synopsis:
This course introduces the overview of post-harvest handling technology of selected commodities that emphasizes on the basic of pre-harvest, harvest factors and post harvest handling technology fresh production, post-harvest treatment and processing, packaging operation and appropriate equipment, post harvest pest management, quality assurance and preparation of fresh cuts, and socio-economics of post harvest.

Course Outcomes:
1. Ability to analyze the physical properties of agricultural products in order to apply the appropriate post-harvest handling technology.
2. Ability to distinguish the packaging operation and propose the appropriate equipment for handling this operation.
3. Ability to differentiate the preharvest and harvest factors that affects on postharvest quality.

References:
AGRICULTURAL WASTE MANAGEMENT AND UTILIZATION ENGINEERING

Course Synopsis:
This course covers the agricultural sources of pollution (pesticides, commercial fertilizer, on-farm food processing wastes and animal manure) and their effect on the environment. Physical, chemical and biological properties of agricultural waste materials, treatment processes of agricultural wastes, methods of land application of agricultural wastes, and technologies for utilization of agricultural wastes for biogas production and animal feed.

Course Outcomes:
1. Ability to recommend suitable physical, chemical and/or biological treatment of industrial and agricultural organic wastes.
2. Ability to design systems for the collection, handling, treatment and utilization of wastes.
3. Ability to propose suitable utilization technique for agricultural waste and wastewater to sustain an environmental

References:
BIO-RENEWABLE SYSTEMS (ELECTIVE)

Course Synopsis:
An in-depth introduction to bio-renewable concepts in relation to converting bio-renewable resources into bio-energy, bio-based products, feedstock production, economics, logistics and marketing of products and co-products.

Course Outcomes:
1. Ability to differentiate biorenewable resources.
2. Ability to compare and contrast the products, co-products, production processes, economics and marketing of bio-renewable resources.
3. Ability to analyze conversion of bio-renewable resources into bio-energy and bio-based products.

References:

PDT480/3

FOOD PROCESSING ENGINEERING (ELECTIVE)

Course Synopsis:
This course covers multidisciplinary field of applied physical sciences that combines science and engineering education for food and related industries. Topics covered include introduction to food engineering, fluid flow theory, heating and cooling processes for foods, thermal processes, food freezing and freeze concentration, evaporation and freeze concentration, food dehydration, filtration, sedimentation and centrifugation, membrane process, extrusion and cleaning and sanitation.

Course Outcomes:
1. Ability to categorize the appropriate physical characteristic according to food processing.
2. Ability to differentiate the principles of food engineering operations.
3. Ability to analyze the problem that involved in food engineering operations and propose the solutions.

References:

PDT481/3
ADVANCES IN AGROTECHNOLOGY (ELECTIVE)

Course Synopsis:
This course covers inventions, achievements, acceptance and challenges in the use of modern agricultural technologies to increase yield and quality of agricultural produce with emphasis on the application, transfer and management of technologies that regulate crop and soil quality in relation to social, technical and environmental conditions.

Course Outcomes:
1. Ability to apply modern technologies in the production, handling and processing of agricultural products.
2. Ability to distinguish modern agricultural technologies that would improve quantity and quality of agricultural products.
3. Ability to experiment with new technologies and alternative solutions in agricultural production.

References:

PDT482/3

FOOD AND HERBAL CROP PRODUCTION TECHNOLOGY (ELECTIVE)

Course Synopsis:
This course covers crop production practices of important food crops (paddy, maize/corn, sweet potato and cassava) in meeting the energy requirements and ensuring food security and food safety as well as selected herbal crops with pharmaceutical/nutraceutical/medicinal properties

Course Outcomes:
1. Ability to distinguish appropriate crop production technology.
2. Ability to apply good agricultural practices in food and herbal crop production.
3. Ability to select new technology to increase yield.

References:


