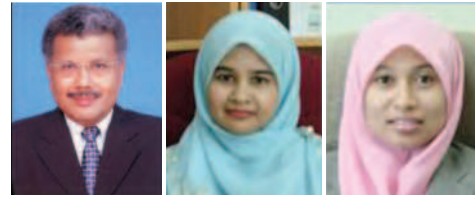


Process and Food Engineering Studies



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INTRODUCTION

In 1996, the Department of Process and Food Engineering was established in Universiti Putra Malaysia to offer a four-year undergraduate programme, namely, Bachelor of Engineering (Process and Food) with an optional area of specialisation in Food Engineering or Biomaterial Process Engineering. The department also offers postgraduate programmes, Master of Science and Doctor of Philosophy with an optional area of specialisation in Food Engineering, Packaging Engineering, Bioprocess Engineering and Agricultural Process Engineering.

The Bachelor of Engineering (Process and Food) programme has been developed in response to the need to enhance agricultural production revenue through value adding processes and meet the requirements of the fast evolving food industry and agricultural related processes. It concentrates on the processing and manufacturing industries, which convert biological or agricultural raw materials into processed foods as well as utilise bio-products or agro-based materials as inputs for the production of consumer goods (food, pharmaceutical and industrial), thus providing the necessary knowledge and skills for future engineers in related areas and applications.

The curriculum incorporates the Outcome Based Education (OBE) approach to teaching and learning which satisfies one of the accreditation requirements of the Engineering Accreditation Council (EAC). The objectives and outcome of this programme will help ensure that the degree remains relevant for years to come. The programme is fully accredited by the EAC and certified by the Board of Engineers, Malaysia. The programme goes through a periodic review every five years by the EAC to ensure continual suitability and relevance to the needs of the nation and industry. An integral part of the accreditation is the report by an independent external reviewer or assessor appointed from professors who come from established and prestigious world class universities. The programme assessment and examination processes are carried out annually.

As a pioneer and the only institution offering this programme in Malaysia, it accepts the responsibility of expanding and developing the process and food engineering field. To meet research and teaching requirements, nine laboratories (Instrumentation and Process Control, Bioreactor Engineering, Agricultural Process Engineering, Food Engineering Unit Operations, Food Processing Quality, Food Processing Machinery Design, Food Engineering

Transport Process, Bio-Material Engineering Properties, Preservation and Packaging) have been established.

The department has four niche research areas, namely, Agricultural Process Engineering, Bioprocess Engineering, Food Engineering and Packaging Engineering. Agricultural Process Engineering focuses on the application of engineering solutions for the post harvest handling, preservation and processing of agricultural and biomaterials; Bioprocess Engineering applies biochemical engineering principles in food processing; Food Engineering applies process engineering technology and concepts for food processing operations; while Packaging Engineering covers the technical design, fabrication and testing of packaging.

PROCESS AND FOOD ENGINEERING DISCIPLINE

Since food is important and the world's agricultural and food supply is highly dependent on and affected by variation in climatic conditions, the need to process and preserve food in large quantities to meet the ever increasing demand necessitates the application of engineering ingenuity, so that healthy and safe foods may be presented for human consumption through effective and efficient processes.

Thus, Process and Food Engineering, an emerging professional engineering area that is highly interdisciplinary in nature, comprises the applications of engineering and biological sciences, as well as incorporates the concepts and techniques of the following processes or operations:

- Utilisation of efficient processes for preparing and preserving raw agricultural or biological materials,
- Transforming and processing agricultural or biological materials by using appropriate techniques, taking into consideration the properties of the materials initially, during processing, and of the final products, to ensure the maximum production rate and highest quality for consumption or further manufacturing, and
- Extracting and purifying agricultural or biological materials into high quality food, pharmaceutical, and industrial materials.

The aforementioned processes can be achieved through the theories, principles, analyses and applications of the following engineering and food quality or safety practices:

- Physical unit operations and process design
- Heat and mass transfer operation and design

- Process modelling and simulation
- Process instrumentation, control and automation
- Process plant design and engineering
- Good Manufacturing Practice (GMP), Hazard Analysis and Critical Control Points (HACCP), and HALAL requirements

As such, Process and Food Engineering education in UPM, as encompassed in the Bachelor of Engineering (Process and Food) curriculum, has the ultimate objective of producing professionals who are competent in the process engineering of agricultural/biological materials into final products for human consumption and further industrial manufacturing.

CURRICULUM

The Process and Food Engineering programme is founded on a balanced blend of basic science or engineering science courses, followed by applied/professional courses with emphasis on the application of engineering principles required for the processing or manufacturing industries which utilises biological or agricultural raw materials as inputs for the production of consumer goods (food, pharmaceuticals and industrial products). These courses cover process operation and design, equipment and machinery design, processing systems, process instrumentation and control, process modelling and simulation, process plant design, packaging engineering and other areas. The students' practical and soft skills are developed through opportunities to participate in seminars, laboratories and computer-aided-design exercises, design projects, industrial training, and other activities.

The students are also required to undergo a minimum of 10 weeks of industrial training in processing establishments (private companies or government agencies) during the semester break in their third year of study. This provides the students with the opportunity to learn firsthand the reality of work in the industry and enables them to see the relevance of the academic programme.

In the final year, students choose an area of specialisation from two options, namely Food Engineering or Biomaterial Process Engineering, to suit their interest and preferences. Biomaterial Process Engineering emphasizes on the application of process engineering principles and concepts for the processing of major agricultural commodity crops and developing new bio-based products for use as food materials and raw materials for the manufacturing industries. On the other hand, Food Engineering emphasizes on the application of process engineering principles and concepts for the food processing industries. The students are required to complete four advanced level courses including the choice of one course from technical elective subjects such as Advanced Processing Systems, Pharmaceutical Technology, Food Extrusion Technology, Microbial Process Engineering, Powder Technology, Rice Processing and Palm Oil Processing.

CAREER OPPORTUNITIES

Graduates from this programme can find career development opportunities in various relevant industries such as manufacturing or processing plant operation and management, engineering design (process, equipment and system design), product development and research. Previous records have shown that the employability of graduates from this programme is very high. The photographs below depict the various activities of the students. ■



Figure 1: Texture analysis of bread in the laboratory of food processing quality



Figure 2: Final year students explaining their plant design project to examiners



Figure 3: Students who participated in research exhibitions and competitions



Figure 4: Student visits and educational tours

Acknowledgement:

The authors wish to thank all staff members of the Department of Process and Food Engineering, UPM, for contributing towards the preparation of this article.

TRAVEL BOOK

A travel book by Ir. Chin Mee Poon, in Mandarin, entitled **“Europe and Asia by Train in 102 Days”** has been published in a professionally designed 20 x 20cm soft cover limited edition.

The 494-page book is now available at **RM48.00** per copy, and can be purchased through the IEM office at 03-7968 4001/2, or email to pub@iem.org.my. Payment can be made by cheque to “The Institution of Engineers, Malaysia”. Part of the proceeds of every book purchased from the IEM will be channelled to the IEM Building Fund.

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