COURSE SYNOPSIS

CORE COURSES

MKMB 1603 - Advanced Techniques for Materials Characterization
This course provides the students with an understanding of the basic principles of advanced techniques of materials characterization which include X-Ray Diffraction, Electron Microscopy, qualitative and quantitative analysis of materials.

MKMB 1613 - Processing and Fabrication of Materials
This course introduces various manufacturing and processing techniques used to produce engineering components from metallic, ceramic and polymeric materials and provides the students with an understanding of the principles and operation of the various fabrication processes.

MKMB 1623 - Microstructure and Mechanical Properties of Materials
By taking this course, students will be able to relate materials microstructure variables to the properties of materials which include metals, polymers, ceramics and composites. The course also provides an understanding of the causes of failure in engineering components and structures, and to introduce methods of fracture control and testing.

MKMB 1903 – Research Methodology
This course aims to provide students with fundamental knowledge of research and the methodologies commonly used in engineering. It encompasses literature review, problem formulation, designing research methods, analysis methods and report writing.

ELECTIVE COURSES

MKMB 2603 - Materials Testing and Quality Control
This course introduces students to the fundamentals of mechanical testing of metallic materials and determines their mechanical properties. It also provides a comprehensive coverage of the various non-destructive testing techniques used to assess the integrity of engineering components and quality of production. The concepts and techniques used in quality control and quality management will be covered.

MKMB 2613 - Corrosion I
The course introduces students to the basic principles of electrochemical corrosion and different forms of corrosion. It provides the students with an understanding of the tools to analyze corrosion problems. The course will also introduce various methods of protection against corrosion.

MKMB 2623 - Foundry Engineering
This course provides an understanding on the principles of solidification of liquid metals and alloys during casting. The course will also provide an understanding of the effect of melt treatment on the structure and properties of cast products.

MKMB 2633 - Advanced Materials
The learning objectives of this course is to provide students an understanding and exposure to the latest development in advanced materials such as special metal alloys, advanced ceramics, composite materials, biomaterials and electronic materials, their properties, processes and applications.

MKMB 2643 - Materials Selection
The course provides students with an understanding of the relationship between the principles of materials engineering and the use of these materials in modern engineering designs and applications. This course will also describe the interaction between the manufacturing process and material selection and the need to adopt concurrent engineering approach.

MKMB 2653 - Corrosion II
After taking Corrosion I, in this course students will be exposed to the various techniques used in corrosion testing and how to successfully manage corrosion in applications such as oil and gas, petroleum and automotive industries.

MKMB 2663 - Surface Engineering
This course gives an appreciation of the importance of materials surfaces in service and to introduce the students to the various techniques of coating and surface modification, the structure and properties produced and their applications. The course will also provide an understanding on the principles of surface modification for better use of engineering materials.

MKMB 2673 - Nanomaterials
This course introduces students to the fundamental aspects of nanomaterials, the importance of the nanoscale materials and their improved properties compare to conventional materials. The course will provide the principles and relative merits of a range of techniques for the production of nanostructures including ultra-thin films and multilayers. The analytical and imaging characterization techniques and the recent applications of nanomaterials in electronics and biomaterials will be briefly discussed.

MKMB 2683 - Modelling in Materials Engineering
The course introduces students to the basic concepts of computer modelling in materials science and engineering. This course covers basic principle in establishing numerical simulation for the evaluation of material properties and phenomena during material processing. It will emphasize on atomistic and microscopic evaluation of material properties and behaviour by computer simulations. In detail, molecular dynamic method will be given as an example of atomistic evaluation method, whereas phase-field method will be introduced as an example of microscopic evaluation method. At the end of the course students should be able to construct simple numerical modelling both in atomistic and microscopic scale.