



UNIVERSITI TEKNOLOGI MARA

CMT640: TEKNOLOGI POLIMER DAN BAHAN

Course Name (English)	TEKNOLOGI POLIMER DAN BAHAN APPROVED
Course Code	CMT640
MQF Credit	3
Course Description	Polymer and material technology is an important discipline that covers all aspect in industrial manufacturing start with the classification of materials to its transformation into the products according to its applications. Materials include plastics and rubbers, metals, ceramics and composites have their unique properties, therefore production of materials required specific technologies. Interestingly, materials technology is a continuously developing discipline. Continuous demand on interesting properties material for new applications acquired new materials and processing techniques. This may found in composite materials in which blend of different materials have the ability to gives superior material properties. As one of main natural rubber producer, rubber and polymer processing and manufacturing are too importance for national polymer industries. The metallurgical processing and production are very importance industrial country such as Malaysia. Materials technology also gives significance contribution on the manufacturing and oil & gas industries.
Transferable Skills	Knowledge Thinking and Scientific Skills Communication Skills
Teaching Methodologies	Lectures, Blended Learning, Discussion, Presentation
CLO	CLO1 Explain the fundamental, classification, preparation and processing, properties and application of polymer, metal, ceramic and composite materials CLO2 Analyse the fundamental, classification, preparation and processing, properties and application of polymer, metal, ceramic and composite materials CLO3 Present scientific idea related to the polymer, metal, ceramic and composite materials technology
Pre-Requisite Courses	No course recommendations
Topics	
1. Introduction to polymer 1.1) Terminologies involved in polymer 1.2) Classification of polymer 1.3) Thermal properties of polymer: Glass transition temperature (T_g), melting point (T_m) and thermal stability of polymer 1.4) Crystallinity (amorphous, semi-crystalline, crystalline), molecular weight (M_w , M_n , and molecular weight distribution)	
2. Types and techniques of polymerization 2.1) Step growth polymerization (Condensation polymerization) 2.2) Chain growth polymerization (Addition polymerization) 2.3) Homogeneous polymerization systems 2.4) Heterogeneous polymerization systems	
3. Plastic and rubber materials 3.1) Commodity and engineering plastics 3.2) Thermoplastics and thermosets 3.3) Elastomers 3.4) Natural rubber: structure, physical and chemical properties 3.5) Synthetic rubber: preparation, physical and chemical properties 3.6) Theory and types of vulcanization	

4. Polymer processing

- 4.1) Internal mixer
- 4.2) Compression moulding
- 4.3) Transfer moulding
- 4.4) Injection moulding
- 4.5) Blow moulding
- 4.6) Extrusion
- 4.7) Calendaring

5. Ferrous, non-ferrous and metal alloys

- 5.1) Classification, production and application of ferrous metals: Pure iron, cast iron, carbon steels, stainless steels, special alloy steels
- 5.2) Production and application of non-ferrous metals: aluminium alloys, copper alloys and nickel alloys
- 5.3) Processing of metals and alloys, annealing, casting, rolling, extrusion, forging

6. Ceramics and glass materials

- 6.1) Traditional, modern and use of ceramic
- 6.2) Clay minerals, talc, silica and silicates
- 6.3) Production, processing and properties of ceramic
- 6.4) Pressing, extrusion, slips casting, injection moulding and glass production
- 6.5) Glasses enamels and properties
- 6.6) Cement and its properties, production of cement, special cements

7. Composites materials

- 7.1) Introduction and classification of composites
- 7.2) Production, properties and application of composites
- 7.3) Classification, type and production of reinforcing phase materials
- 7.4) Polymeric, ceramic and metal as matrix in composites

Assessment Breakdown	%
Continuous Assessment	60.00%
Final Assessment	40.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Students are require to submit a report on chapter 4 related to polymer processing technology.	20%	CLO3
	Test	Students are required to answer a written test individually that covers content related to polymer and its technology.	40%	CLO1

Reading List	Recommended Text	<ul style="list-style-type: none"> • Ravve, Abraham 2012, <i>Principles of Polymer Chemistry</i>, Springer • Carraher Jr, Charles E. 2012, <i>Introduction to Polymer Chemistry</i>, CRC Pressl Lic • W. D. Kingery. 1976, <i>Introduction to ceramics</i>, John Wiley Sons • K.K. Chawla, G 1987, <i>Composite Materials</i>, Springer Publication • Michael Ashby & David Jones 1988, <i>Engineering Materials</i>, Perfamon Press
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	