Annex A

New Course Code and Title	MS7440 - Environmental and Thermal Degradation of Polymeric Materials
Details of Course	**Summary of course content** *(please note that this information provided will also be uploaded to the web for viewing at large)* Environmental durability and thermal stability of polymeric materials are critical aspects that will influence their service-life. Therefore, it is important to have a fundamental understanding of the degradation behaviours of polymeric materials, and how different environmental parameters and application (service) requirements will influence their usage and stability. This course dwells into these aspects along with exploring some case studies to highlight the importance of the topics. This course is designed for Materials Science and Polymer Engineering disciplines, but content also will benefit students from other science and engineering specialties.
	Rationale for introducing this course Environmental stability and durability of polymeric materials is an important aspect This is a new module of 2 A.U. that explores the fundamentals of environmental and thermal degradation of polymeric materials while also dwelling into standards on durability and practical applications/issues. Many of the topics proposed in this module are relatively absent in the existing curriculum and therefore, highlights the importance of introducing this module to the students.
	Aims and objectives The major aims of the module are: 1. To highlight the importance of environmental and thermal stability of polymers in terms of influencing their durability and service-life; 2. To describe the various mechanisms and kinetics of environmental degradation processes in polymers; 3. To discuss the various protection methodologies used to guard against environmental degradation; 4. To elaborate on the different thermophysical properties of polymers and their importance during the service-life; 5. To introduce the fundamentals of polymer combustion and importance of fire protection and flame retardancy in polymer systems. This will be carried out by highlighting and relating to major incidents that have happened in the world as example case studies.

	Syllabus
	
	• Introduction and applications that demand environmental durability and thermal stability of polymers
	• Environmental degradation in polymers and associated mechanisms
	  ○ Hydrolysis
	  ○ Oxidative and photolytic degradation
	  ○ Environmental stress cracking
	  ○ Bacterial and fungal degradation
	  ○ Pro-degradation
	  ○ Kinetics of degradation
	• Macroscopic consequences of environmental degradation
	• Protection against environmental degradation
	• Standards that govern the durability processes
	• Importance of different thermophysical properties
	  ○ Thermal conductivity
	  ○ Thermal diffusivity
	  ○ Heat capacity
	  ○ Thermal expansion
	  ○ Thermal degradation and thermo-oxidative stability
	• Polymer combustion and basics of flame retardancy

Assessment Please specify if components are individually assessed or group assessed	*Final Examination* *Individual* *40%* *Participation* *Individual* *10%* *assignments / CA Case study* Individual 20% *presentation* *Group* *30%*
	Total: 100 %
Hours of Contact/Academic Units	*26 hours / 2 AU*
Proposed Date of Offer	*Sem 1 AY2022-23*
Instructor and Co-instructor (if any)	A/P Aravind Dasari
Class size	No restrictions
Any duplication of course School is advised to coordinate/check with the School offering the course to avoid duplication.	No