

### MS4666 – Environmental Degradation of Plastics

<b>Course Code</b>	MS4666				
<b>Course Title</b>	Environmental Degradation of Plastics				
<b>Pre-requisites</b>	MS1013	Materials Chemistry I			
	MS1014	Materials Chemistry II			
	MS2013	Polymers and Composites			
<b>Pre-requisite for</b>	NIL				
<b>No of AUs</b>	1				
<b>Contact Hours</b>	Lectures + CA	10	Tutorials	3	
<b>Course Aims</b>					
<p>The course aims to provide a broad overview on the various physical and chemical processes of plastic weathering and the potential harm it may exert to the environment – through the lens of materials scientists.</p> <p>The module is designed to foster and develop student’s knowledge of issue pertaining to plastics weathering testing, characterisation, mechanisms of polymer degradation and microplastics pollution. Based on the imparted knowledge, students will be encouraged to be aware and think critically on the societal-environment caused by plastic weathering.</p>					
<b>Intended Learning Outcomes (ILO)</b>					
<p>By the end of this course, you (as a student) would be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the physical and chemical changes associated to plastic degradation</li> <li>2. Recommend and justify the appropriate characterisation techniques to examine plastics degradation</li> <li>3. Explain the molecular mechanisms of photooxidation and biodegradation of plastics</li> <li>4. Understand the different and the working principles of stabilization additives to limit plastic degradation</li> <li>5. Demonstrate knowledge on the process of microplastics generation and possible associated environmental harm</li> </ol>					
<b>Course Content</b>					
<ol style="list-style-type: none"> <li>1. Physicochemical changes and characterization of weathered plastic materials</li> <li>2. Photo-oxidation of polymers: Principles and mechanism; Photo-chemistries and oxidation; Photo stabilization of polymers with the use of additives (e.g. pigments, UV absorbers, antioxidants, etc)</li> </ol>					

3. Biodegradation of polymers: Micro-organism mediated enzymatic degradation; materials factors influencing biodegradation rate; Protection against biodegradation; Approaches to examine biodegradation.
4. Microplastics pollution: Primary and Secondary Microplastics; Microplastics characterisation; interaction of microplastics and chemical pollutants; Biological impact of microplastics.

### **Course Policies and Student Responsibilities**

(1) CA

Absentees must be supported by a medical certificate or other valid official documents.

### **Academic Integrity**

Good academic work depends on honesty and ethical behavior. Quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honor Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student of NTU, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at the University. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, and collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.