

Course Title	<b>Polymer Nanocomposites</b>		
Course Code	<b>MME 557</b>		
Course Type	<b>Compulsory</b>		
Level	Graduate		
Year / Semester	Fall semester (offered every 2 <sup>nd</sup> year)		
Teacher's Name	Theodora Krasia		
ECTS	8	Lectures / week	1x3 hrs (including 6 hrs laboratory experiments/demonstrations per semester)
Course Purpose and Objectives	<u>The Polymer Nanocomposites postgraduate course, aims in enriching the knowledge and expertise of postgraduate students on the synthesis, characterization and applications of polymer-based nanocomposites.</u>		
Learning Outcomes	<ul style="list-style-type: none"> <li>• Discuss on the basics on polymers.</li> <li>• Recognise the advantages and disadvantages of nanoparticle inclusion into polymers and discuss on the use of different nanoparticulates as additives in polymer nanocomposites.</li> <li>• Acquire knowledge on various synthetic approaches employed in the preparation of polymer-based nanocomposites; Gain hands-on experience in related synthetic processes.</li> <li>• Describe and discuss on the basic principles of various methods used in the characterization of polymer nanocomposites. Use UV-Vis and FTIR for characterizing polymer nanocomposites and get familiar with the mechanical testing system and the SEM <i>via</i> lab demos.</li> <li>• Recognise the broadness in the use of polymer nanocomposites in various fields.</li> </ul> <p><b>General learning outcomes:</b></p> <ul style="list-style-type: none"> <li>• Develop presentation skills through oral presentations in class.</li> <li>• Retrieve and analyse scientific manuscripts on the topic.</li> <li>• Learn to work in small groups in the lab and prepare lab reports.</li> </ul>		
Prerequisites	NO	Required	NO
Course Content	<p><b>Lectures (in the form of ppt. presentations)</b></p> <ul style="list-style-type: none"> <li>• Introduction to polymers</li> <li>• Introduction in polymer nanostructured materials - Overview of different types of nanoparticles introduced within polymer matrices</li> </ul>		

	<ul style="list-style-type: none"> <li>• Synthetic methods towards the fabrication of polymer-based nanocomposites</li> <li>• Polymer nanocomposites characterization techniques</li> <li>• Applications of polymer-based nanocomposites</li> </ul> <p><b>Laboratory experiments/demonstrations</b></p> <ul style="list-style-type: none"> <li>• Synthesis of polymer-coated metallic nanoparticles</li> <li>• Fabrication of magnetic electrospun polymer nanocomposite fibers</li> <li>• Fabrication of polymer/carbon fiber composites by 3D printing</li> <li>• Materials characterization: Mechanical testing, microscopy, UV-vis, FTIR.</li> </ul>
Teaching Methodology	<ul style="list-style-type: none"> <li>- Lectures (in the form of ppt. presentations)</li> <li>- Use of audio and video tools</li> <li>- Laboratory experiments/demonstrations</li> <li>- Presentations by students</li> </ul> <p>Communicative, Collaborative</p> <p>During the first week of the semester, the Syllabus of the course is given by the teacher, which includes information on the course content, expected learning outcomes, assessment and office hours</p>
Bibliography	<ul style="list-style-type: none"> <li>• Polymer Nanocomposites: Processing, Characterization, and Applications, Joseph H. Koo, <b>ISBN: 9780071458214</b> (2006)</li> <li>• Scientific manuscripts and review papers</li> <li>• Course handouts</li> </ul>
Assessment	<ul style="list-style-type: none"> <li>• Quiz: 15% (introductory lecture)</li> <li>• Final examination: 50%</li> <li>• Group presentations/round table discussions: 15%</li> <li>• Laboratory group reports: 20%</li> </ul>
Language	English