

<b>COURSE NUMBER</b>	<b>ME 471</b>		
<b>COURSE TITLE</b>	<b>Introduction to Polymer Processing Techniques</b>		
<b>COURSE STRUCTURE</b>	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)		
<b>COURSE COORDINATOR</b>	<b>Kwabena A Narh</b>		
<b>COURSE DESCRIPTION</b>	This course is designed to familiarize students with the manufacturing techniques for converting polymer feedstocks into plastic end products. It involves a study of various plastics processing techniques. Included in these processes are extrusion, injection molding, blow molding, compression molding, thermoforming, rotational molding, casting, etc. The relationship between product and choice of process will be presented. This course also incorporates laboratory demonstrations..		
<b>PREREQUISITE(S)</b>	ME 304, ME 407		
<b>COREQUISITE(S)</b>	None		
<b>REQUIRED, ELECTIVE OR SELECTED ELECTIVE</b>	Elective		
<b>REQUIRED MATERIALS</b>	Plastics Product Design and Process Engineering, Harold Belfosky, Hanser/Gardner, (1995)		
<b>Other supplemental materials (not Required)</b>	<ol style="list-style-type: none"> <li>1. Technology of Thermoforming, J.L. Throne, Hanser Gardner Publications, 1996</li> <li>2. Polymer Process Engineering, R.G. Griskey, Chapman and Hall, 1995.</li> <li>3. Blow Molding Handbook, D.V. Rosato and D.V. Rosato, Hanser, 1988</li> </ol>		
<b>COMPUTER USAGE</b>	Use of Autodesk Moldflow for troubleshooting plastics manufacturing problems.		
<b>COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:</b>	Course Learning Outcomes	SOs*	Expected Performance Criteria
	1. <b>identify</b> different classes of plastics for engineering purposes.	e	<b>Homework Assignment</b> (80% of the students will earn a grade of 75% or better on this assignment)
	2. <b>compare</b> cost of a given volume of plastic product with a non-plastic product such as metal	a, e	<b>Report</b> (80% of the students will earn a grade of 75% or better on the report)
	3. <b>determine</b> the power-law index from a log viscosity vs. log shear rate plot	a, e	<b>Exam Question</b> (80% of the students will earn a grade of 75% or better on this question)
	4. <b>determine</b> the effect on flow	a, b, e	<b>Same as 1</b>

	behavior of polymeric fluids upon change of processing conditions										
	5. <b>list</b> the major parts of a given polymer processing equipment	k	<b>Same as 1</b>								
	6. <b>describe</b> the functions of the main elements of each equipment	k	<b>Exam Question</b> (80% of the students will earn a grade of 75% or better on this question)								
	7. <b>perform</b> simple analytical calculations relating to the design of the auxiliary	a, b	<b>Homework &amp; Exam Question</b> (80% of the students will earn a grade of 75% or better )								
	8. <b>relate</b> specific plastic products with a plastic processing equipment	e, k	<b>Project</b> (80% of the students will earn a grade of 75% or better on this project)								
	9. <b>apply</b> measurement data to troubleshoot problems with the operation of polymer processing equipment	a, b, d, k	<b>Same as 8</b>								
<b>CLASS TOPICS</b>	<ol style="list-style-type: none"> <li>1. Fundamentals of Plastic Materials.</li> <li>2. Fundamentals of Melt Rheology.</li> <li>3. <b>Polymer Processing Equipment:</b> <ol style="list-style-type: none"> <li>a. Screw Extrusion Processes: components of an extruder, extruder screws, extrusion dies - strand, monofilament, fiber, cast film, blown film, wire coating, cable sheathing, profile, and rod. Operation.</li> <li>b. Injection Molding Processes - components of a molding machine, clamp side, plasticating side, cycle time, components of a mold, sprues, runners, gates, cavities, ejection system, types of molds. Operation.</li> <li>c. Blow Molding - sequence of operations.</li> <li>d. Thermoforming - vacuum, drape, plug-assisted, matched mold. Sequence of operation.</li> <li>e. Rotational Molding - sequence of operation.</li> <li>f. Relation of process to product.</li> <li>g. Extrusion compounding - intensive mixers, twin-screw and kneaders, feeders, mixing devices.</li> </ol> </li> <li>4. Materials of construction of molds and dies, surface treatments and coatings.</li> <li>5. Project on Simulation of injection Molding.</li> </ol>										
<b>STUDENT OUTCOMES (SCALE: 1-3)</b>	a	b	c	d	e	f	g	h	i	j	k
	3	3	2	3	3						3
	3 – Strongly supported 2 – Supported 1 – Minimally supported										

\* Student Outcomes