MSE 223L – Materials Processing Laboratory

Designation: Required

Catalog description: This course offers a series of laboratory modules involving materials processing including polymers, metals, ceramics, electronic materials, glasses and thin films. (2 units) Offered in the Spring

Prerequisite(s): (none)

Textbook(s) and/or other materials: Students must purchase a laboratory coat and laboratory notebook.

Course objectives: The objective of the course is to familiarize students with the physical characteristics of materials and the processes used to form them using hands-on experiences.

Topics covered: (Class Hours)

1. Laboratory safety and research notebooks. (3)
2. Clays and glazes, slip casting and shaping. (6)
3. Glass coloring and vitreous sintering (6)
4. Shaping and molding plastics, foaming polymers. (6)
5. Cement, concrete, bend test (6)
6. Vitrifying glasses, pulling fibers and rods. (6)
7. Fiber composites, epoxy/glass or carbon fibers (6)
8. Mid-term design project (12)
9. Heat treating steel, quenching, hardness testing (6)
10. Casting aluminum alloy, anodizing of aluminum alloy. (6)
11. SolidWorks/3D Printing. (6)
12. Plant tour 1 – mirror lab at UA (casting, polish-
13. ing, coating) (3)
14. Processing of rubbers, vulcanization, latex balloon fabrication. (6)
15. Plant tour 2 – Competitive Engineering (advanced machining, plastic injection molding) (3)
16. Final exam, assessment (3)

Class/laboratory schedule

1. Two laboratory sessions per week. "Pre-lab" quiz for each new topic. Each session is 3 hrs in duration.
2. Laboratory notebooks assessed weekly for accuracy, clarity, and completeness.
3. Mid-term team design project.
4. Final examination.

Contribution to Professional Component:

_____% Math & Basic Sci.	_____credits Math & Basic Sci.	
50 % Engr. Science	〉	2 credits Engr. Topics
50 % Engr. Design		

Relationship to program outcomes:

Level of Activity (High, Medium, or Low)	PROGRAM OUTCOMES - To produce graduates who can:
	apply the fundamentals of mathematics, the physical and/or life sciences, and engineering principles.
H	apply the fundamentals of materials science and engineering, the interrelationship among processing, microstructure, properties, and performance, and can apply that knowledge in solving problems.
M	work individually and in teams in order to define alternative solutions from diverse knowledge bases and implement an acceptable solution in a local, national or global context.
M	communicate effectively in verbal presentations, written reports and other media.
L	utilize modern engineering tools used in the profession.
L	use resources such as library facilities, the internet, data bases, professional society offerings, etc., as part of life-long learning.
	value life-long learning and can put into action their responsibilities to the profession and society.

Person preparing syllabus: **David R. Poirier**