MSE 4022: Materials Laboratory II

Credit hours and contact hours: 1-0-3-2

Instructor: Radhakrishnaiah Parachuru

Textbook: No textbook required. Instructor notes used.

Specific course information

Catalog description: Processing, structure, properties relationships are explored through a series of hands-on experiments. Instruction on basic laboratory skills, safety, statistical analysis of data, use of laboratory notebooks and technical report writing.

Prerequisites: MSE 2021 – Materials Characterization

Course: Required

Specific goals for the course

Outcomes of instruction:

1. Enable students to work efficiently in self-managed groups
2. Provide an opportunity to test and verify basic concepts learned in multiple courses
3. Provide an opportunity to analyze data and make correct interpretations
4. Enhance ability in oral and written communication, including technical communication
5. Impart training to optimally choose materials and processes to suit specific end-use requirements
6. Expose to multiple learning resources and help understand their value for professional growth
7. Put emphasis on honesty, discipline, hard work and sincerity
8. Give ability to interpret personal work in the context of immediate past and future

Student Outcomes:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

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(3) An ability to communicate effectively with a range of audiences.

 (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics covered:

Polymers
    Polymer extrusion/fabrication
    Melt flow behavior of polymers
    Thermal characterization of polymers
    Structural analysis of polymers

Metals
    Casting
    Cold and hot drawing
    Homogenization
    Ageing
    Grinding and Polishing
    Imaging for microstructural analysis
    Hardness testing
Ceramics
    Dry and wet fabrication
    Sintering
    Measurement of particle size and density
    Measurement of the properties of sintered materials

Correlation between Outcomes of Instruction and Student Outcomes:

Outcomes of Instruction	Student Outcomes						
	1	2	3	4	5	6	7
1. Enable students to work efficiently in self-managed groups			X			X	
2. Provide an opportunity to test and verify basic concepts learned in multiple courses	X					X	
3. Provide an opportunity to analyze data and make correct interpretations	X					X	
4. Enhance ability in oral and written communication, including technical communication			X				
5. Impart training to optimally choose materials and processes to suit specific end-use requirements	X						
6. Expose to multiple learning resources and help understand their value for professional growth	X						X
7. Put emphasis on honesty, discipline, hard work and sincerity			X				
8. Give ability to interpret personal work in the context of immediate past and future	X					X	

School of Materials Science and Engineering Student Outcomes:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration for public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

(3) An ability to communicate effectively with a range of audiences.

(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.