Mechanical Engineering Dept. Department

Syllabus
ME 476: Non-Metallic Materials (3-0-3)

Course Catalog Description:

Structure, mechanical properties, and processing of ceramics, polymers, and composites. Selection of nonmetallic materials in applications related to energy, aerospace, and civil infrastructure.

Course Pre-requisites:

- ME 216: Materials Science and Engg.
- ME 217: Materials Lab

Course Objectives:

1. To broaden the knowledge of students about polymers, their structures, mechanical properties, and processing.
2. To broaden the knowledge of students about ceramics, their structures, mechanical properties, and processing.
3. To broaden the knowledge of students about composites, their structures, mechanical properties, and processing.
4. To teach students how to select non-metallic materials for different applications.

Course Learning Outcomes:

CLO1. demonstrate a basic understanding of the structure, mechanical properties, and processing of polymers.

CLO2. demonstrate a basic understanding of the structure, mechanical properties, and processing of ceramics.

CLO3. demonstrate in-depth understanding of the structure, mechanical properties, and processing of composites.

CLO4. demonstrate an ability to select appropriate non-metallic materials for specific applications

Learning Resources:

- Materials Science and Engineering: An Introduction, William Callister, 9th Edition, John Wiley & Sons, Inc., 2015.
- Composite Materials: Science and Engineering, 4th edition, Chawla, Krishan, Springer, 2019.
- Materials Selection in Mechanical Design, 5th Edition, Michael Ashby, Butterworth-Heinemann, 2016.

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Project	week 13	25.0%
Exam 2	week 15	30.0%
Homework	week 2, 5, 8, 11, 14	5.0%
Quiz	week 2, 5, 8, 11, 14	15.0%
Exam 1	week 8	25.0%

Lecture Weekly Schedule:

Week#	Topics
1	Polymers: structure, properties, processing
2	Polymers: structure, properties, processing (Continue)
3	Ceramics: structure, properties, processing
4	Ceramics: structure, properties, processing (Continue)
5	Composites: structure, processing
6	Composites: structure, processing (Continue)
7	Mechanical properties of composites
8	Mechanical properties of composites (Continue)
9	Mechanical properties of composites (Continue)
10	Non-metallic materials for energy applications
11	Non-metallic materials for energy applications (Continue)
12	Non-metallic materials for aerospace applications
13	Non-metallic materials for aerospace applications (Continue)
14	Non-metallic materials for civil infrastructure applications
15	Non-metallic materials for civil infrastructure applications (Continue)