## **MECH 210: Materials Science (3 credits)**

This course will enable students to get the fundamental knowledge about materials structure and their mechanical properties in order to select the appropriate materials for engineering applications and design. The course will also provide basic understanding on various modes of materials strengthening and failure. It will cover various types of materials namely metals, polymers and composites.

***Prerequisites:*** *CHEM 101*

**Course Learning Outcomes:**

By the end of the course, students will be able to:

A1. Demonstrate detailed knowledge and understanding of mechanical properties of various engineering materials.

B1. Distinguish group of materials based on their mechanical properties.

B2. Identify risk of failures relevant to engineering applications.

B3. Analyse strengthening methods for specific materials with specific engineering applications.

C1. Work in a team to create possible solutions based on material sciences contexts that will demonstrate independence and responsibility for the nature and quality of work output.

**Course Learning Materials:**

* Fundamentals of materials science and engineering, William Smith, Javad Hashemi, McGraw-Hill
* Introduction to Materials Science for Engineers, James F. Shackelford, Pearson

**Course Content:**

1. The Structure of Crystalline solids
2. Density Computation
3. Polymorphism and allotropy
4. Imperfections in solids
5. Point Defects
6. Microstructure and grain size
7. Diffusion
8. Steady State Diffusion
9. Non-Steady state diffusion
10. Mechanical properties of metals
11. Basic Phase Diagram and alloying
12. Dislocation and plastic deformation
13. Mechanics of strengthening of metals