## MECH 314: Engineering Design: Mechanical Components (3 credits)

This course involves the application of advanced mechanics, physical properties of materials, solid mechanics, and dynamics to the design of machine elements such as chains, spur gears, shafts, bearings, connections, and other mechanical power transmission devices. (Prerequisite: CIVL 301)

**Course Learning Outcomes:**

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

A1. Acquire advanced knowledge and thorough understanding of the basics of machine design.

A2. Demonstrate the ability to use various concepts, formulations, principles, and methods in machine design to tackle technical problems in the real world.

B1. Analyze, and solve technical problems related to the design of mechanical systems.

B2. Predict failure of machine elements under static and dynamic loads.

B3. Investigate thoroughly the different possible modes of machine elements failures and offer alternative solution(s) using standard (off-the-shelf) mechanical components and/or customized components.

**Course Learning Resources:**

* Machine Elements in Mechanical Design 6th Edition. by Robert Mott, Edward Vavrek , Jyhwen Wang. ISBN-13: 978-0134441184, ISBN-10: 0134441184
* Fundamentals of Machine Component Design 5th Edition. by Robert C. Juvinall, Kurt M. Marshek, ISBN-13: 978-1118012895, ISBN-10: 1118012895
* Machine Design: An Integrated Approach 6th Edition. by Robert Norton. ISBN-13: 978-0135184233, ISBN-10: 0135184231
* Shigley's Mechanical Engineering Design 11th Edition. by Richard Budynas, Keith Nisbett, ISBN-13: 978-0073398211, ISBN-10: 0073398217

**Course Content:**

1. Fundamental Principles.
2. Working stresses and failure theories.
3. Belts and chains drives.
4. Spur gears.
5. Transient vibration of one Degree of Freedom (DOF) systems subjected to general excitations.
6. Rolling element bearings.
7. Lubrications and journal bearings.
8. Connections.
9. Connections/ Keys.