Course Name: MEC-236 Machine Design

Date Updated: 4/2022

Credit Hours/week: 4 hrs./wk. – 4 cr.

BEGINNING: SPRING 2022

Catalog Description: This course is the rational design and selection of machine elements considering their economics and manufacturability. The principles of strength of materials and mechanics are applied to the design of bearings, shafts, gears, springs, brakes, and other elements of importance in mechanical systems. Consideration of service criteria, operating environments, and cost. Emphasis on developing a systematic design philosophy.

Prerequisite: MEC 141 – Strength of Materials for Engineering Technology

Text: Mechanical Design of Machine Components, 2nd Edition, Ugural

Supplementary Material: Check Blackboard for Notes

Syllabus:

Period	Topics
1	Introduction to Systems Engineering/Stress Review
2	Deflection/Moment Area Method/Theorem of Three Moments
3	Maximum Stress Theory/Mohr's Circle
4	Fatigue
5	Exam 1/Shafts
6	Bearings
7	Spur Gears
8	Helical and AGA Equations
9	Belts and Chains
10	Exam 2/Clutches
11	Clutches and Brakes (Thermal Analysis)
12	Springs
13	Keyways and Splines
14	Bolts and Permanent Connections/Design Project Review
15	Final Exam

Students are expected to adhere to the policies of the County College of Morris. These can be accessed at: (insert link here)

Statement of Expected Course LEARNING OUTCOMES

- Explain the concepts of stress and strain on machine members.
- Calculate stresses due to application of tensile, compressive, shear and torsional forces on machine members.
- Calculate beam deflection due to multiple loads.
- Utilize the theorem of three moments to analyze a statically indeterminate beam.
- Construct Mohr's Circle for biaxial stresses. Utilize Mohr's Circle to determine stress at any given point.
- Explain effects of the rating factors in material selection and sizing.
- Utilize the rating factors in shaft design with particular emphasis on environmental and vibration limitations.
- Analyze shaft load and operation to select bearings and lubricant.
- Select machine springs based on deflection, operating frequencies, loads, operating environment.
- Analyze machine fasteners for applicability and safety.
- Design belt drive system based on desired load, speed, available space.
- Select gear train system based on desired load, speed, power constraints.
- Analyze weld and rivet connections for stability and safety.
- Select gaskets and seals based on operating parameters.