COURSE INFORMATION

COURSE PREFIX/NO: **MET 231**
COURSE TITLE: **Machine Design**
LEC HRS/WK: 3.0
LAB HRS/WK: 3.0
CREDIT HRS/SEMESTER: 4.0
DL ATTENDANCE/VA STATEMENT TEXTBOOK INFORMATION

COURSE DESCRIPTION:

This course covers the design and applications of machine elements such as shafts, couplings, springs, brakes, clutches, gears and bearings. It also covers the applications of principles of DC/AC, statics, strength of materials, engineering drawing and dynamics to the design of simple machines.

COURSE COMPETENCIES:

Upon successful completion of this course, the student should be able to demonstrate competency in the following areas:

Module 1: Friction and bearings
- Determine frictional forces
- Determine bearing pressure
- Select antifriction bearings

Module 2: Shaft Design
- Calculate torsional stress in a shaft
- Calculate torsional deflection in a shaft
- Analyze a shaft in bending and torsion
- Determine critical speed of a shaft

Module 3: Fasteners, belting, and chain drives
- Select fasteners
- Select belts
- Select chain drives

Module 4: Brakes, clutches, flywheels
- Analyze brakes
- Analyze clutches
- Analyze flywheels

MINIMAL STANDARDS:

Through closed book tests and/or assignments, the following objectives must be met:

Module 1: Friction and bearings

Student should be able to determine the frictional force in various design scenarios and factor it in to the design of the finished product.

Student should be able to determine bearing pressure in bushings.

Student should be able to use appropriate calculations, tables, and/or nomograms to select antifriction bearings.

Module 2: Shaft Design

Student should be able to calculate the torsional stress in a shaft and use that information to properly analyze a design.

Student should be able to calculate the torsional deflection in a shaft and use that information to properly analyze a design.

Student should be able to analyze a shaft that is in both bending and torsion and make appropriate design decisions.

Student should be able to determine the critical speed of a shaft and understand its importance in operation.

Module 3: Fasteners, belting, and chain drives

Student should be able to discuss the common fasteners types and make basic determinations of holding power.

Student should be able to discuss the common types of belting and choose a proper belt to fit a particular design scenario.

Student should be able to understand the advantages and disadvantages between belt and chain drives.

Student should be able to select a single-strand chain to fit a particular design scenario.

Module 4: Brakes, clutches, flywheels

Student should be able to analyze different configurations of brakes and determine their effectiveness at stopping a shaft.

Student should be able to analyze different configurations of clutches and determine their effectiveness at transmitting power.

Student should be able to understand the need for flywheels and calculate the energy and stress in a given flywheel.

COURSE REQUIREMENTS:

ATTENDANCE

Students will be bound by the policies stated in the York Technical College Student Handbook. Students must attend 80% of the hours assigned the class for a semester to receive credit for the course.

In case a student does miss a class, the student is responsible for obtaining the material that was covered during the absence.

NO MAKE UP TESTS WILL BE GIVEN. If a student is aware that a test will be missed, then the student should notify the instructor prior to the class period, or at the earliest possible date. At the discretion of the instructor, based on documentation provided by the student, the student may be given an alternate assignment to substitute for the test grade. (For example, a term paper of length and topic determined by the instructor.) No more than one test score may be substituted per student.

The student has the burden to be sure that some arrangement was made with the instructor for resolving a missed test. If no arrangements are made, or proper documentation is not provided regarding the absence, a grade of zero will be recorded for that test.

PARTICIPATION IN CLASS DISCUSSIONS

It is expected that students will actively participate in class discussions and will read the text and take notes during lectures.

ACADEMIC HONESTY:

Students are expected to adhere to the College policy regarding student conduct as stated in the College handbook.

"York Technical College adheres to the South Carolina TECH Student Code, approved by the State Board for Technical and Comprehensive Education on June 10, 1998. Copies of this code are available in the Library and from Student Services. ...Any student caught cheating or involved in any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action."

EVALUATION STRATEGIES/GRADING:

The grading scale is as follows:

GRADE	POINTS
A	90 - 100
B	80 - 89
C	70 - 79
D	60 - 69
F	0 - 59

The class grade will be determined as follows:
(NOTE: All modules are weighted equally.)

Tests	40%
Assignments	15%
Final Exam/Project	40%
Conduct/Participation	5%
	100%

ENTRY LEVEL SKILLS:

The entering student should have knowledge and understanding of basic drafting and dimensioning guidelines and practices. Students should also have an understanding of three-view orthographic projection and the format of standard engineering drawings. Students should have prior experience preparing drawings with a basic CAD package (e.g., AutoCAD).

Student should have a knowledge of statics and be able to determine forces and moments and draw clear free-body diagrams.

PREREQUISITES:

EGR 190

CO-REQUISITES:

MET 211

TOPIC/CONTENT OUTLINE:

Friction
Bearings
Antifriction bearings
Torsional stress
Torsional deflection
Bending and torsion
Critical speeds
Fasteners
Belts
Chain drives
Brakes
Clutches
Flywheels

Disability Statement: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Office (SRO) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.