

Camosun College
Mechanical Engineering Technology Department
MECH 147 – Mechanical Theory
Course Outline

Calendar Description:

This course provides the foundation for the application of mechanical theory by WEng System Maintainer. Topics include principles of stress analysis, journal and anti-friction bearings, shaft arrangements, gearing and machine construction.

Offered:	Winter Semester
Credit:	4
In-Class Workload:	4 hours Lecture, 1 hour Laboratory
Out-of-Class Workload:	5 hours

Objectives:

Upon successful completion of this course, the student will be able to:

1. Describe components of the machine design process.
 2. Explain the principles of the application of stress analysis (including safety factors).
 3. Calculate stress and strain in shafts and other mechanical systems.
 4. Explain the principles of journal bearings.
 5. Select journal bearings based on system requirements.
 6. Explain the principles of anti-friction (roller element) bearings.
 7. Compare the aspects of anti-friction and journal bearings.
 8. Explain the principles of various shaft arrangements.
 9. Explain the principles of gearing.
 10. Explain the principles of machine construction.
 11. Compare belt and chain drives.
 12. Compare various fasteners.
-

Outline:	<i>Estimated Hours</i>
1. <i>The Machine Design Process</i> Machine Design Process Stresses – Normal and Shear	5
2. <i>Stresses and Strains</i> Stresses on Inclined Planes Normal and Shear Strain Poisson's Ratio	5
3. <i>Principal Stresses</i> Safety Factors Geometric Stress-Concentration Factors Maximum Normal and Shear Stresses	5
4. <i>Welded Connections</i> Determining Weld Size – Length and Depth Stresses and Strains Due to Thermal Expansion	5
5. <i>Torsion</i> Interference Fits and Transferred Torque Torsional Shear Stress Transverse Shear Stress Angle of Twist Polar Moment of Inertia	5
<i>Midterm #1 – Covers Sections 1, 2, 3 and 4</i>	2
6. <i>Torsion (Continued)</i> Power Transmission in Shafts Keys, Splines and Couplings	3
7. <i>Journal Bearings</i> Journal Bearing Construction Journal Bearing Materials Bearing Types and Specification Lubrication	5
8. <i>Roller Element Bearings</i> Types of Roller Element Bearings Lifetime, Loading, Lubrication, Failure	5
9. <i>Introduction to Cam / Follower Systems</i>	5
<i>Midterm #2 – Covers Sections 5, 6, 7 and 8</i>	2

10.	<i>Design of Gears</i>	8
	Gear Trains	
	Gear Teeth – Design and Failure	
	Lifetime of a Gear Tooth, Gear, or Mating Pair of Gear	
11.	<i>Belt and Chain Drives</i>	5
	Viscous Shearing Stresses; Petroff's Bearing Equation	
	Hydrodynamic Lubrication, Bearing Characteristic Curves	
	Temperature Rise in Plain Bearings	
	Zn/P curve; Bearing Materials	
	Construction of Bearing	
11.	<i>Clutches and Brakes</i>	5
	Introduction to Common Types of Bakes and Clutches	
	Plate Clutches and Brakes	
	Disc Clutches	
	Cone Clutches and Brakes	
	Drum Clutches and Brakes	
	Band Clutches and Brakes	
	Energy Absorption and Heat Dissipation	
	Design Examples Involving Translation and Rotation	

		Total Hours: 65

Distribution of Marks:

Assignments	15%
Lab reports	10%
Midterm #1	20%
Midterm #2	20%
Final Exam	35%

	100%

All assignments must be submitted before sitting the final exam.

Grading:

A+	90 -> 100%	B-	70 -> 72%
A	85 -> 89%	C+	65 -> 69%
A-	80 -> 84%	C	60 -> 64%
B+	77 -> 79%	D	50 -> 59%
B	73 -> 76%	F	< 50%

The weighted average of all exams must be over 50% or an I or F will be awarded.

Reference Text:

Machine Elements in Mechanical Design
Mott, Vavrek and Wang, 6th Edition, Pearson Publishing

Instructor:

Sam Behfarshad, PhD, P.Eng.
Office: TEC264 Telephone: 250-370-4445
Office hours will be posted on the bulletin board outside my office and on Desire-2-Learn.

Reference Website:

<http://online.camosun.ca> This course is fully supported by Desire2Learn

Assignments and Laboratories:

No late assignments and lab report will be accepted.

Assignments will be reviewed in class shortly after the due date. If identical assignments are handed in, the marks will be divided up equally between the students.
