DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**
ME 436 Machine Design 2

2. **Credits and contact hours**
(3+0) 3 credit hours, 3 contact hours

3. **Course type**
Blended Learning Course (2+1)

4. **Instructor's or course coordinator's name**
Dr. Riyad abu Mallouh

5. **Textbook information**
Richard G Budynas and Keith J Nisbett, shigley's Mechanical Engineering Design (in SI Units), 10th, 2014
ISBN-13: 978-9814595285

   a. **Other supplemental materials**
   Design of Machine Elements, M.F. Spotts by Prentice Hall

   Fundamentals of Machine component Design, R.C. Juvinall by John wile

6. **Specific course information**
   a. **Catalog description**
   Cams**,** Spur and helical gears**,** Bevel and worm gears**.** Calculations of normal – and planetary - gears**,** Flexible mechanical elements (Belts and Chains)**,** Clutches Brakes, Shaft, axles and spindles and Design of compound elements.

   b. **Prerequisites or co-requisites**
   Prerequisite: ME 430 Machine Design I; Prerequisite: ME 331 Theory of Machines

   c. **The course is:**
   Required in Mechanical Engineering program.

7. **Specific goals for the course**
   a. **Course outcomes:**

After completion of the course, students are expected to be able to:
1. Analyses and design of cams**,**
2. Analyses and design of gears
3. Calculations of normal – and planetary – gear trains**,** Flexible mechanical elements (Belts and Chains)**,** Clutches Brakes , Shaft, axles and spindles
4. Design of compound elements.

   b. **The following student outcomes are addressed by the course:**

SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

SO-(d) an ability to function on multidisciplinary teams.

SO-(i) recognition of the need for, and an ability to engage in life-long learning

SO-(pc-3) prepare students to work professionally in mechanical systems.

1. **Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:**

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Analyses and design of cams.	-	Lectures (Example and Problems)	First Exam
CO-(2): Analyses and design of gears.	-	Lectures (Example and Problems)	Second Exam
CO-(3): Calculations of normal – and planetary – gear trains**,** Flexible mechanical elements (Belts and Chains)**,** Clutches Brakes , Shaft, axles and spindles	-	Lectures (Example and Problems)	Final Exam
CO-(4): Design of compound elements		Lectures (Example and Problems)	Final Exam

Student Outcomes			
SO-(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	2	Lectures (Example and Problems)	First Exam
SO-(d) an ability to function on multidisciplinary teams.	1, 3	Lectures (Example and Problems)	Second Exam
SO-(i) recognition of the need for, and an ability to engage in life-long learning	1	Lectures (Example and Problems)	Final Exam
SO-(pc-3) prepare students to work professionally in mechanical systems		Lectures (Example and Problems)	Final Exam

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2. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Mon (11-12:30)	Chapter 13: **Gears—General**: Fundamentals	Lecture
	Wed (11-12:30)	Chapter 13: **Gears—General**: Straight Bevel Gears Parallel Helical Gears	Lecture
2	Mon (11-12:30)	Chapter 13: **Gears—General**: Worm Gears	Lecture
	Wed (11-12:30)	Chapter 13: **Gears—General**: Tooth Systems Gear Trains	Lecture
3	Mon (11-12:30)	Chapter 13: **Gears—General**: Force Analysis—Spur Gearing	Lecture
	Wed (11-12:30)	Chapter 13: **Gears—General**: Force Analysis—Bevel Gearing Force Analysis—Helical Gearing	Lecture
4	Mon (11-12:30)	Chapter 13: **Gears—General**: Force Analysis—Worm Gearing	Lecture
	Wed (11-12:30)	Chapter 14: **Spur and Helical Gears**: The Lewis Bending Equation AGMA Stress Equations	Lecture
5	Mon (11-12:30)	Chapter 14: **Spur and Helical Gears**: AGMA Strength Equations	Lecture
	Wed (11-12:30)	Chapter 14: **Spur and Helical Gears**: Geometry Factors I and J (Z_I and Y_J) and The Elastic Coefficient C_p (Z_E) Dynamic Factor K_v and Overload Factor K_o	Lecture
6	Mon (11-12:30)	FIRST EXAM	Lecture
	Wed (11-12:30)	Chapter 14: **Spur and Helical Gears**: Surface Condition Factor C_f (Z_R) and Size Factor K_s Load-Distribution Factor K_m (K_H) and Hardness-Ratio Factor C_H (Z_W)	Lecture
7	Mon (11-12:30)	Chapter 14: **Spur and Helical Gears**: Stress-Cycle Factors Y_N and Z_N and Reliability Factor K_R (Y_Z) 755	Lecture
	Wed (11-12:30)	Chapter 14: **Spur and Helical Gears**: Temperature Factor K_T (Y_u) and Rim-Thickness Factor K_B Safety Factors S_F and S_H and analysis	Lecture
8	Mon (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Bevel Gearing—General	Lecture
	Wed (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Bevel-Gear Stresses and Strengths AGMA Equation Factors	Lecture

9	Mon (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Straight-Bevel Gear Analysis	Lecture
	Wed (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Design of a Straight-Bevel Gear Mesh Worm Gearing—AGMA Equation	Lecture
10	Mon (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Worm-Gear Analysis	Lecture
	Wed (11-12:30)	Chapter 15: **Bevel and Worm Gears:** Designing a Worm-Gear Mesh Buckingham Wear Load	Lecture
11	Mon (11-12:30)	Chapter 16: **Clutches, Brakes, Couplings, and Flywheels**: Static Analysis of Clutches and Brakes Internal Expanding Rim Clutches and Brakes	Lecture
	Wed (11-12:30)	SECOND EXAM	SECOND EXAM
12	Mon (11-12:30)	Chapter 16: **Clutches, Brakes, Couplings, and Flywheels**: External Contracting Rim Clutches and Brakes	Lecture
	Wed (11-12:30)	Chapter 16: **Clutches, Brakes, Couplings, and Flywheels**: Band-Type Clutches and Brakes Frictional-Contact Axial Clutches	Lecture
13	Mon (11-12:30)	Chapter 16: **Clutches, Brakes, Couplings, and Flywheels**: Disk Brakes	Lecture
	Wed (11-12:30)	Chapter 16: **Clutches, Brakes, Couplings, and Flywheels**: Cone Clutches and Brakes	Lecture
14	Mon (11-12:30)	Chapter 17: **Flexible Mechanical Elements**: Belts	Lecture
	Wed (11-12:30)	Chapter 17: **Flexible Mechanical Elements**: Flat- and Round-Belt Drives V Belts	Lecture
15	Mon (11-12:30)	Chapter 17: **Flexible Mechanical Elements**: Timing Belts	Lecture
	Wed (11-12:30)	Chapter 17: **Flexible Mechanical Elements**: Roller Chain Wire Rope	Lecture

3. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	20%	1-16th Week
- Final Examination	50%	16th Week

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Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.