

BAEN 375 Design Fundamentals of Agricultural Machines and Structures (Fall 2020)
COURSE SYLLABUS

Course Description:

Design Fundamentals for Agricultural Machines and Structures. (3-0). Credit 3. Applications of stress/strain relationships and failure theory to the design of agricultural machines and structures; structural properties of engineering materials; finite element analysis and computer aided engineering design. Prerequisite: CVEN 305.

Lecture Schedule: Monday, Wednesday, and Friday, 9:10 - 10:00 am

Required Textbook:

Norton, R. L. 2013. *Machine Design: An Integrated Approach* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Suggested References:

Budynas, Richard G. and J. Keith Nisbett. 2015. *Shigley's Mechanical Engineering Design* (10th Edition). McGraw Hill Series, New York.

Prerequisite: CVEN 305 (Mechanics of Materials)

Instructor:

Dr. Sergio Capareda Scoates 303D
Phone: 458-3028 E-mail: scapareda@tamu.edu
Consultation Hours: MWF: 10-12 Noon; T-TH: 9-12 am and 3-5 pm

Teaching Assistant: To be named

Name	Office:
Phone:	E-mail:
Consultation Hours: By Appointment	

Learning Outcomes

Students who successfully complete this course will learn to apply fundamental concepts in the design, manufacturing, and selection of mechanical components for agricultural machines, structures, and machine systems.

At the end of this course, the student should be able to

1. Identify the functions of common machines and design concepts for machine and structural components, machines, and machine systems
2. Enumerate the properties of mechanical materials and measurement thereof
3. Determine load/stress and deflection of mechanical and structural elements
4. Evaluation of how components fail
5. Designing machines with common components
6. Designing machine systems
7. Name some fundamentals of the Engineer's Code of Ethics

Students will be introduced to engineering software tools to aid their understanding of these concepts. Upon mastering the material in this course, students will have the knowledge needed for more advanced courses in machine design, the ability to design safe and appropriate basic mechanical systems, and to perform well on the mechanical engineering sections of the Engineering Fundamentals exam required to become an Engineer-in-Training.

A Few Ground Rules

1. Read the syllabus and adhere to it carefully.
2. Make it to class on time (no extra time will be given for quizzes), and figure out a way to stay awake.
3. No electronic devices are to be used during class. If you bring them to class, they are to be put away. Failure to observe this rule may result in removal from class, a deduction of 1 full point from the Professionalism grade, and a zero on any subsequent class work that day.

See the following articles for background:

- http://www.newyorker.com/tech/elements/the-case-for-banning-laptops-in-the-classroom?utm_source=tny&utm_campaign=generalsocial&utm_medium=facebook&mbid=social_facebook,
 - <http://chronicle.com/blogs/linguafranca/2014/08/25/why-im-asking-you-not-to-use-laptops/>
 - <http://m.chronicle.com/article/Todays-Lesson-Life-in-the/148423/>.
 - <https://www.firstthings.com/blogs/firstthoughts/2015/01/to-students-close-laptops-use-pencils>
 - <http://www.npr.org/2016/04/17/474525392/attention-students-put-your-laptops-away>
4. Don't eat, chew gum, use tobacco, etc., during class. You may bring a drink with a lid to class, as-long-as you are careful and quiet with it.
 5. Don't carry on side conversations during class, as these distract your classmates and show disrespect for the instructor.
 6. No whining.

Helpful Hints for Success in This Class

1. Attend class. I reserve the right to deviate from the plan of study and you never know what might come up in class. Furthermore, if you don't show up, you will miss quizzes, which will harm your grade!
2. Do all the homework assignments to the best of your ability. Exam material will closely follow the assignments, and a solid understanding of the homework will help assure an understanding of the exam material.
3. Spend time outside of class to read, review, and understand the material.
4. Ask questions. Demonstrate a desire to learn.
5. Treat this course as you would a business meeting and the instructor as your supervisor. The instructor will give you assignments, and you are to do them in a professional manner.
6. Email is the preferred method of business communication and will be treated as such in this class. If you are not diligent in reviewing and responding to email, learn to be so.
7. The instructor will be available for one-on-one consultation. Please take advantage of this opportunity early and not at the end of the semester.

COURSE GRADING AND FORMAT

Grading:		Mean Scores	Letter Grade
1. Long Exams (4 Modules)	60%	90 – 100	A
2. Homework (32 Practice Tests)	20%	80 to < 90	B
3. Design Work and Group Discussions (4)	15%	70 to < 80	C
4. Professionalism and Others	5%	60 to < 70	D
		< 60	F

The final exam is optional for students with a passing pre-final score. For those taking the final exam, the final grade will be 60% of the pre-final score and 40% of final exam score.

Class Format:

This is a 3-hour lecture course. There will be homework each lecture class and short quizzes or class activities, exercises and group discussion for most lecture topics. The homework is done on eCampus and will include objectives and technical calculations. Hand-outs and assigned chapters from the references list will be given. There will be practice tests in eCampus. The students must complete these homework activities after each lecture and before the next lecture.

Exams:

Tentative dates for the four long exams are in the course schedule. The final dates will depend upon the pace of class lectures. Exams may include both problems to solve and short answer/multiple choice questions. Exams will be individual work and closed book and closed notes. Students will be provided conversion tables, formulas and monographs. The final exam will follow the University Schedule. It will be a comprehensive exam.

Make-up Exams:

Make-up exams will be for those having a university excused absence (see Student Rules). Make-up exams will be re-scheduled as agreed upon by students.

Group Discussions

There will be group discussions. Students must login to eCampus and participate to get points. We have rubrics for point distribution. Group discussions are due within a week of posting.

Practice Questions and Practice Tests

The graded homework exercises for this class are the practice tests. Each lecture topic will have sample problems and questions. Student should solve them or answer the questions while listening to the lecture or after class. They will then log on to eCampus website to check the solutions. When they are ready to complete a graded practice test, they do so online. Students can prepare for the long test by doing numerous practice tests.

Academic Integrity:

For many years Aggies have followed a Code of Honor, which is stated in this very simple verse:

*Aggies do not lie, cheat, or steal,
nor do they tolerate those who do.*

The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified.

The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other.

It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. Section 20 of the Texas A&M University Student Rules covers scholastic dishonesty including cheating, aiding and abetting cheating, plagiarism, fabrication of information, and violations of departmental and college rules.

20.1.3 Plagiarism:

Failing to credit sources used in a work product in an attempt to pass off the work as one's own. Attempting to receive credit for work performed by another, including papers obtained in whole or in part from individuals or other sources.

Students should refer to the University policy on academic integrity found in the **Honor Council website:** <http://www.tamu.edu/aggiehonor/honorcouncil.php>. We will use University Guidelines for violations. If you have any questions regarding plagiarism or cheating, please consult the Texas A&M University Student Rules, under the section Scholastic Dishonesty.

Americans with Disabilities Act (ADA) Policy Statement

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit <http://disability.tamu.edu>. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Attendance:

We check attendance every class. It is the student's responsibility to learn the material and make up any assignments missed. In the event that a student must miss an exam. He is responsible for make-up. Refer to the Texas A&M University Student Rules for any questions you have on attendance. A student with complete attendance will receive a 2.5 bonus points towards their pre-final scores. No bonus points will be given to students with more than three (3) absences. Please review the following website to student rule 7:

<http://student-rules.tamu.edu/rule07>

Section 7 of the Texas A&M University Student Rules outlines the attendance policy.

The university views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. Instructors are expected to give adequate notice of the dates on which major tests will be given and assignments will be due. Graduate students are expected to attend all examinations required by departments or advisory committees as scheduled formally.

7.1 The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for absence.

Among the reasons absences are considered excused by the university are the following: (see 7.5)

- 7.1.1 Participation in an activity appearing on the university authorized activity list. (see List of Authorized and Sponsored Activities)
- 7.1.2 Death or major illness in a student's immediate family.
- 7.1.3 Illness of a dependent family member.
- 7.1.4 Participation in legal proceedings or administrative procedures that require a student's presence.
- 7.1.5 Religious holy day. (See Appendix IV.)
- 7.1.6 Illness that is too severe or contagious for the student to attend class (to be determined by Health Center or off-campus physician).
- 7.1.7 Required participation in military duties.
- 7.1.8 Mandatory admission interviews for professional or graduate school which cannot be rescheduled.

Attendance will be graded mainly as a part of in-class quizzes, but an excessive number of unexcused absences will also result in a reduction in the Professionalism grade.

EXAM Schedule

Exam #	Day	Date	Chapter Coverage
Exam #1	Monday	September 14, 2020	Chapters 1-4
Topics: Introduction, materials and processes, kinematics, loads, stress, strain, and deflection			
Exam #2	Wednesday	October 10, 2020	Chapters 5-8
Topics: Static, fatigue and surface failure theories, and finite element analysis			
Exam #3	Friday	October 30, 2020	Chapters 9-12
Topics: Design case studies, shaft keys and couplings, bearings and lubrication, and spur gears			
Exam #4	Monday	November 23, 2020	Chapters 13-17
Topics: Helical, bevel, worm gears, springs, screws & fasteners, weldments, clutches & brakes			
Finals	Monday	December 7, 2020	All Chapters (1-17)
Topics: All topics from Chapter 1 – 17.			

**BAEN 375 Design Fundamentals of Agricultural Machines and Structures
Class Lecture Schedule Fall 2020**

Week	Class	Date	Topic	Readings
1	1	08-24-2020 M	L01: Introduction to Design (15)	Chapter 1
	2	08-26-2020 W	L02: Materials and Processes 1 (1-15)	Chapter 2
	3	08-28-2020 F	L03: Materials and Processes 2 (16-30)	Chapter 2
2	4	08-31-2020 M	L04: Kinematics & Load Determination 1 (1-40)	Chapter 3
	5	09-02-2020 W	L05: Kinematics & Load Determination 1 (41-80)	Chapter 3
	6	09-04-2020 F	L06: Stress, Strain and Deflection 1 (1-60)	Chapter 4
3	7	09-07-2020 M	L07: Stress, Strain and Deflection 21 (61-120)	Chapter 4
	8	09-09-2020 W	L08: Stress, Strain and Deflection 3 (121-140)	Chapter 4
	9	09-11-2020 F	R1: Review for Exam #1	Chapters 1-4
4	10	09-14-2020 M	Exam #1	Chapters 1-4
	11	09-16-2020	L09: Static Failure Theories 1 (1-40)	Chapter 5
	12	09-18-2020	L10: Static Failure Theories 2 (41-75)	Chapter 5
5	13	09-21-2020	L11: Fatigue Failure Theories 1 (1-60)	Chapter 6
	14	09-23-2020	L12: Fatigue Failure Theories 2 (61-120)	Chapter 6
	15	09-25-2020	L13: Surface Failures 1 (1-30)	Chapter 7
6	16	09-28-2020	L14: Surface Failures 2 (31-60)	Chapter 7
	17	09-30-2020	L15: Finite Element Analysis 1 (1-30)	Chapter 8
	18	10-02-2020	L16: Finite Element Analysis 2 (31-60)	Chapter 8
7	19	10-05-2020	R2: Review for Exam #2	Chapter 5-8
	20	10-07-2020	Exam #2	Chapters 5-8
	21	10-09-2020	L17: Design Case Studies 1 (1-15)	Chapter 9
8	22	10-12-2020	L18: Design Case Studies 2 (16-30)	Chapter 9
	23	10-14-2020	L19: Shaft keys and Couplings 1 (1-35)	Chapter 10
	24	10-16-2020	L20: Shaft keys and Couplings 2 (36-75)	Chapter 10
9	25	10-19-2020	L21: Bearings and Lubrication 1 (1-30)	Chapter 11
	26	10-21-2020	L22: Bearings and Lubrication 2 (31-60)	Chapter 11
	27	10-23-2020	L23: Spur Gears 1 (1-30)	Chapter 12
10	28	10-26-2020	L24: Spur Gears 2 (31-60)	Chapter 12
	29	10-28-2020	R3: Review for Exam #3	Chapters 9-12
	30	10-30-2020	Exam #3	Chapters 9-12
11	31	11-02-2020	L25: Helical, Bevel and Worm Gears (1-24)	Chapter 13
	32	11-04-2020	L26: Springs 1 (1-40)	Chapter 14
	33	11-06-2020	L27: Springs 2 (41-80)	Chapter 14
12	34	11-09-2020	L28: Screws and Fasteners 1 (1-40)	Chapter 15
	35	11-11-2020	L29: Screws and Fasteners 2 (41-80)	Chapter 15
	36	11-13-2020	L30: Weldments 1 (1-40)	Chapter 16
13	37	11-16-2020	L31: Clutches and Brakes (1-20)	Chapter 17
	38	11-18-2020	L32: Ethics and Engineering Ethics	Handouts
	39	11-20-2020	Review for Exam #4	Chapters 13-17
14	40	11-23-2020	Exam #4	Chapter 13-17
	41	11-25-2020	Reading Day: No Classes	
	42	11-30-2020	Redefined Day (Friday Class)	
15	43	12-02-2020	Last Day of Classes	
	44	12-04-2020	Final Exams Starts	
	45	12-07-2020	Monday, 8-10 am Final Exam	All Chapters