

ME 4710/6710 Computer Aided Engineering Analysis & Design

Prerequisites

Numerical methods and computer programming experience.

Course Location: Online only

Course Start Date: June 2018

Course End Date: August 2018

Course Instructor & Contact Information

Dr. Gregory M. Mocko

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Email: gmocko@clemson.edu

Office: 243 EIB and Online

Office Hours: By appointment

Course Catalog Description and Objectives

The course exposes students to geometric and solid modeling, finite elements, optimization and rapid-prototyping. Students are expected to develop a solid foundation in CAD theory and currently available software tools. To accomplish this, students design an artifact, represent it on the computer, analyze it using FEA then optimize it before producing a prototype. The course emphasizes the use of computer-based tools for engineering design. The course is a lab intensive course covering the theory and application of CAD/CAM/CAE software to address engineering design problem.

The course is designed to provide students with the theoretical foundations of CAD/CAM software applications as well as practical application for use in engineering problems. A software package is used to demonstrate many of the ideas in the course, but the focus is not on *training* students on a particular software package. The course is divided into lecture presentations and lab demonstrations that are meant to support learning. The course will include assignments (individual work) and a review.

The primary objectives of this course are to develop in the student:

- the ability to recognize the limitations of CAD, CAE, and CAM software,
- a familiarity with current engineering software support, and
- the ability to demonstrate sound, rational approaches to the solution of engineering problems
- the ability to use engineering software to support design
- identify research and development opportunities in CAD/CAM/CAE

The course will be taught as an undergraduate and graduate course. The material in the course will be taught at the bridge between graduating seniors and new graduate students. In other words, the course material is designed to challenge you. The course will be graded independently for undergraduate and graduate students. All graded material will be divided into graduate and undergraduate.

A deeper understanding and reflection of the course material is expected from the graduate students.

Student Learning Outcomes

- Identify how product life cycle management (PLM) approaches and software are used in design-manufacturing enterprises.
- Understand the mathematical representations of lines, surfaces, and solid models.
- Develop knowledge of Finite Element Analysis and developing computational models
- Demonstrate knowledge in optimization and how it is used in engineering design applications

Required Textbook

- Zeid, I., 2004, *Mastering CAD/CAM*, McGraw-Hill Inc., New York, NY, USA

References (Required Reading)

- Taylor, D.L., 1992, *Computer Aided Design*, Addison Wesley
- Onwubiki, C.O., 1989, *Foundations of Computer Aided Design*, West Publishing
- Mortenson, M., 1985, *Geometric Modeling*, Wiley
- Rogers, D. and J.A. Alan, 1990, *Mathematical Elements for Computer Graphics*, McGraw-Hill Inc., New York, NY, USA.
- Anand, V., 1993, *Computer Graphics & Geometric Models for Engineers*, Wiley
- Jacobs, P., 1992, *Rapid Prototyping and Manufacturing - Fundamentals of Stereolithography*, SME
- Knight, C.E., 1993, *The Finite Element Method in Mechanical Design*, PWS Kent

Course Calendar

You will find a calendar for course activities by clicking the **Syllabus button** in the **Course**

Menu.

Course Organization

Instructional content is organized in *Lessons* or grouped with corresponding assessments. The outlines of the lesson are provided in BB.

Course Content

- Readings: For each of the reading assignments you will read from course material and be expected to discuss with the instructor and other students through Blackboard. In addition, you may be expected to write essays on the course readings.
- Individual Assignments: You will be given the opportunity to apply content presented in this course through assignments. These may include hand calculations, use of engineering software, and computer programs
- Final Review: Students will receive a final assessment based on the elements of the course as a whole.

Instructions for each of the course assignments are provided on Blackboard.

Course Navigation

- Announcements: Will include updates, reminders and information of the course.
- Faculty: Information about the instructor and grading assistant in the course
- Syllabus: Explains the course objective, grading rubric, student responsibility, and course organization
- Schedule: Contains the schedule of the course.
- Learning Modules: Provides notes, assignment, and lecture information

- Discussions: Involves students answering questions and communication with the instructor and other students in the course.
- Grades: Displays feedback and grades for course assessment.
- Tools: These include tools available on Blackboard for communication and other features

Individual Assignments

You are required to complete several individual assignments. The following guidelines must be followed.

- Assignment must be turned in on time. Ten (10) points will be deducted from the grade for each day an assignment is overdue. After four days, no credit will be given to a late assignment. A weekend counts as one day.
- Include your last name, page number, total number of pages, and title on each of the pages.
- All assignments should be professional quality (clear, concise, and correct). Do not pass in sloppy work – if I cannot read it, it will not be graded.
- Care is important in presenting and communicating your thoughts, ideas, and conclusions, both to insure success in this course and to develop these communication tools.
- Brevity can be achieved without sacrificing content – be concise and state your conclusions and observations clearly. Long, verbose discussions are not required.
- Your work will be evaluated by the material that you provide, no interpretation will be done. Mistakes are not minor in engineering, a sign error can mean life or death, a significant digit can cost billions of dollars, a poor assumption can lead to catastrophic failure.
- Help will be provided to those individuals who are prepared with a good attempt at the problem – Be Prepared with notes and questions.
- Assignments must be submitted as PDF files (see above for file naming convention)

Grading

Grade	Percentage score	Explanation
A	90 – 100	Excellent Indicates work of a very high character, the highest grade given.
B	80 – 89	Good Indicates work that is definitely above average, though not of the highest quality.
C	70 – 79	Fair Indicates work of average or medium character.
D	60 – 69	Pass Indicates work below average and unsatisfactory, the lowest passing grade.
F	0 - 59	Failed Indicates that the student knows so little of the subject that it must be repeated in order that credit may be received.

Undergraduate Student Grading

Category	Percent Weight
Individual Assignments	80%
Final Review	20%

Graduate Student Grading

Category	Percent Weight
Semester Paper	20%
Individual Assignments	60%
Final Review	20%

Note the undergraduate and graduate students are graded on a different scale.
You will be treated like adults in this course. As such grading is strict, but fair.

General Policies & Procedures

Students are expected to adhere to all policies and procedure outlined by Clemson University at:
<http://www.clemson.edu/administration/student-affairs/student-handbook/universypolicies/index.html>.

Honor Code

The Clemson University statement on academic integrity applies to all students in this class and will be rigorously enforced. That statement can be found at:

<http://www.registrar.clemson.edu/publicat/catalog/sections/aca regs/>

Cheating includes giving or receiving assistance of any kind on an exam, homework, or final by any means. Cheating is grounds for failure in this course. This will be strictly enforced. Questions frequently arise concerning the acceptability of working together on design problems. In this course, you may consult other students only for the purpose of brainstorming on GENERAL solution strategies. You must do the actual homework problem on your own. Copying another student's work is prohibited. A single instance of copying a design problem is grounds for failing this course. Cheating, in addition to being a violation of the university honor code, is also a violation of this syllabus.

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

A simple definition of plagiarism is when someone presents another person's words, visuals, or ideas as his or her own. The instructor will deal with plagiarism on a case-by-case basis. The most serious offense within this category occurs when a student copies text from the Internet or from a collective file. This type of academic dishonesty is a serious offense that will result in a failing grade for the course as well as the filing of a formal report to the University.

Special Accommodations

If special accommodations are required for the student, please see the professor so that proper arrangements may be made. Arrangements must be made within the first week of class.

Accommodations for Students with Disabilities

Students with disabilities who need accommodations should make an appointment with Dr. Arlene Stewart, Director of Disability Services, to discuss specific needs within the first month of classes. Students should present an Academic Accommodation Letter from Student Disability Services when they meet with instructors. Student Disability Services is located in Suite 239 Academic Success Building (656-6848; sds-l@clemson.edu). Please be aware that accommodations are not retroactive and new Academic Accommodation Letters must be presented each semester. For more information visit:

<http://www.clemson.edu/campus-life/campus-services/sds/>

Clemson University Title IX (Sexual Harassment)

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at <http://www.clemson.edu/campus-life/campus-services/access/title-ix/>. Mr. Jerry Knighton is the Clemson University Title IX Coordinator and Director of Access and Equity, located at 111 Holtzendorff Hall, [864-656-3181](tel:864-656-3181) (voice) or [864-565-0899](tel:864-565-0899) (TDD).

Academic Support Services

Students may access a variety of academic support services to support your learning in the online classroom. Here are links to services available:

- Academic Success Center: <http://www.clemson.edu/asc/staff.html>
- The Writing Center: <http://www.clemson.edu/centers-institutes/writing/>
- Clemson Online Library Guides: <http://libguides.clemson.edu/distanceed>
- Online Library Resources: <http://www.clemson.edu/library/>
- CCIT (Tech Support): http://www.clemson.edu/ccit/help_support/ or CCIT (Tech Support) email: ithelp@clemson.edu
- Academic Advising: <http://www.clemson.edu/academics/advising/index.html>
- Registrar: <http://www.registrar.clemson.edu/html/indexStudents.htm>

Copyright Statement

Materials in this course are copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Refer to the Use of Copyrighted Materials and "Fair Use Guidelines" policy on the Clemson University website for additional information:

<http://libguides.clemson.edu/content.php?pid=84458&sid=627522>

Academic Grievances

Academic grievances are handled by [Dr. Jeffrey Appling](#) in Undergraduate Studies or [Dr. Frankie Felder](#) for Graduate Studies. Students are advised to visit the [Ombuds Office](#) prior to filing a grievance.

Receiving Grades & Instructor Feedback

Assignment grades and feedback are provided generally **1 day** after the assignment is due and always before an assignment of the same type is due. Unless otherwise stated, grades and feedback will be available via the *Grades* area of the online course site.

Accepting Late Work

Late work will be accepted up to one week from the original deadline, but may be subject to a grade penalty. Late work submitted more than one week from the original deadline may receive a failing grade. All work must be submitted by the last day of the course; no extensions or late work will be accepted beyond that date. Please plan ahead.

Communicating Strategy

Because of privacy regulations, University faculty and staff may email students only through Clemson email. Therefore, you must use your Clemson email account in this course for all email communications. Check your Clemson account at least three times per week for important messages.

Students are expected to monitor email and the course website for course announcements.

Students are expected to use the Clemson email account in this course for all communications.

You have *numerous* ways of communicating with your instructor: phone, email, the *Ask the Instructor* forum, and live consultations by appointment.

- If you have a question about an assignment or class procedure, consider posting it in the *Ask the Instructor* forum so that other members of the class can benefit from it, too. A lot of learning can happen in this forum if you use it, so please do!
- If you have a personal concern (such as a question about a grade), send a message to your instructor through the online course site or through your Clemson email account.
- I am here to help you, so please ask questions and seek clarification as early and as often as needed. Delay will only hinder your learning.

Instructor Response

The instructor response time is 36 hours from questions posted in Blackboard and sent via email. The response time excludes weekends and official University closures. If you need live assistance email me to arrange an online or phone consultation.

Minimum Technical Skill Requirements

Students are expected to have a minimum working knowledge of computers and a word processing program to be successful in an online class. You must be comfortable with your computer system and willing to deal with any problems that may arise. Lack of technical knowledge can greatly interfere with your learning a new subject. If you do not have these skills, consider taking a short computer course prior to enrolling in an online course.

- Get your password and login to your class before the semester begins (if available)
- Attach files to email messages
- Compose written documents in a Word processor such as [Microsoft Word](#)
- Word processing tasks (type, cut, paste, copy, name, save, rename, etc.)
- Download information from the Internet
- Use of a Web browser
- Completing online forms
- Backup your files
- Install and maintain anti-virus and other software

Students are expected to be comfortable accessing the online course site and downloading files such as Microsoft Office documents, YouTube videos, and PDFs. In addition, students should be able to use Microsoft Office to compose written documents, spreadsheets, and PowerPoint presentations.

For technical assistance with the online course site, students should contact ithelp@clmson.edu or visit CCIT's website: http://www.clemson.edu/ccit/help_support/

Netiquette Policy

Netiquette, in short stands for Internet etiquette. Always practice netiquette when communicating electronically. There are two basic guidelines

- Don't waste people's time
- Don't say anything online that you wouldn't say face to face.

Guidelines for netiquette include the following:

- Be respectful of other participants. This includes their time, their bandwidth, and their opinions.
- Don't post excessive messages that will take a long time to read and interpret.
- While not recommended, some participants may be on a dial-up connection. Large Graphics and video can take hours to download on a slow connection.
- Everybody has an opinion. Keep your critiques constructive. Try not to offend anyone. If you do offend someone or become offended, do not post antagonistic messages. This is considered flaming. Instead contain the heat; just do not respond at all.
- Remember the Human. Remember that you are communicating with people who do not have the advantage of seeing your body language or hearing inflections in your voice. This may cause misinterpretation of your message.
- Avoid sending large attachments unless specifically asked
- Avoid grammatical and spelling errors
- Using all caps and exclamation marks may be interpreted as SHOUTING!!!
- Add humor and personality to your messages by using emoticons.
- Remember the written word. When you communicate via technology, you should remember that any message you send can be saved or forwarded by its recipient. Chances are they are stored on a computer where you have no control.

Attending Class

Taking an online course is a different style of learning for many people. You may think you will be learning on your own, but you will soon discover many opportunities to work as a team with other students and to communicate with the instructor of your online course. You will find the support you need and have a great learning experience.

Because you do not come on campus and sit in a classroom, attendance is determined by your active participation and communication in the course. You will spend ***at least 9 hours each week*** completing course activities, participating in online discussions, and otherwise interacting with your instructor, classmates, and course content.

Log into the online course site and check your Clemson email at least three times weekly.

Successful online students keep a schedule just as if they were attending class on campus, and they communicate with one another and their instructor frequently. Attendance is vital to your success.

Meeting Deadlines

Assignments are due by ***11:55 pm, Eastern Time*** on the day specified unless otherwise stated.

Plan ahead for the unexpected! You are accountable for staying on schedule should technological or other problems arise. You should immediately contact the instructor if an emergency may affect your ability to meet course deadlines.

An online course gives you the flexibility to do your coursework when it best fits your schedule, as long as you meet deadlines set by your instructor. Do not let this flexibility be your downfall. Set aside time in your schedule to participate online and to complete your assignments. You will have frequent deadlines to keep you on track. Do not fall behind. Playing catch-up causes stress, and stress reduces learning.

Many students juggle school, work, family, and other life responsibilities all at the same time. If a serious life issue prevents you from staying current in your coursework, contact your instructor as soon as possible to explain your circumstances. Do not let school or life responsibilities overwhelm you. The faculty and staff at Clemson are aware that students face challenges, and we are committed to your success. Often, we may be able to help you see a way to deal with your circumstances and still complete your courses. We have a lot of experience. Give us the chance to help you.

Learning

What matters most in any course is what you actually learn. Online learning allows you many different ways to learn, such as reading your textbook, following the hands-on practice in your assignments, communicating with your classmates and your instructor, and discovering other resources across the Internet. If you actively participate in your course, you will get constructive feedback to help you with your learning. Stay active in your course and focused on your learning to get the most out of it.

Changes

Occasionally, circumstances require the instructor to change the syllabus. Should the instructor find a change necessary, you will be notified as soon as possible. You might print this syllabus for ready referral.

Agreement

If you disagree with any of the policies or procedures spelled out above or cannot accept the demands of the course (i.e., the amount of time and work required), you need to drop the course as soon as possible. By staying in the course, you agree to comply with all the policies and procedures described in this syllabus.