**SE 410 Syllabus – Fall 2024**

**Course Name:** SE 410 – Component Design

**Lecture:** 1:00 pm to 1:50 pm on Monday, Wednesday and Friday

**Location:** 101 Transportation Building

**Instructor Information:**

Dr. Yumeng Li (yumengl@illinois.edu)

Office: 212 Transportation Building

Office hours: 2:00 pm to 3:00 pm on Monday

**Teach Assistant:** TBD

**Catalog Description:**

Design of basic engineering components: structural members, machine parts, and connections. Principles applied include: material failure (yield, fracture, fatigue); buckling and other instabilities; design reliability; analytical simulation.

**Course Objectives:**

By the end of this course, you should be able to:

* Conduct quantitative analysis of mechanical systems from an engineering design perspective.
* Design mechanical systems based on quantitative analysis (e.g., statics, dynamics, stress, strength, stability).
* Solve open-ended engineering design problems, including systems that involve multiple interacting components.
* Demonstrate a solid understanding of analysis, design, and selection of basic engineering components using standard design methods and practices.

**Prerequisites:**

SE 311 and SE 320. It is expected that students in SE 410 have basic programing skills.

**Required Text:**

* Shigley’s Mechanical Engineering Design (Ninth or Tenth Edition, Budynas and Nisbett)
* Structural Steel Design (Fifth Edition, McCormac and Csernak)

**Recommended Reading Material**:

* Machinery’s Handbook (Oberg, Jones, Ryffel, McCauley, and Heald)

**Course Website:**

Canvas will be used to post important announcements, documents, and homework assignments. It can be accessed at <https://canvas.illinois.edu> using your NetID and password. Grades will also be posted on Canvas. Please check it regularly. Class sessions include a mix of lecture and discussion.

**Homework:**

There are 10 homework assignments. Homework will be assigned throughout the semester in weekly fashion based on a week of lecture content and typically due the Saturday of the week following content delivery. The lowest one homework score will be dropped.

The following policy will be applied to late homework submissions:

<24 hours late: 80% of unpenalized score

>= 24 hours and <48 hours late: 60% unpenalized score

>=48hrs late: no credit

While it is encouraged to work on homework as a group, please ensure you know how to work through the homework problems, so you are well-prepared for the exams, quizzes and course project. Electronic submission is required for homework. Homework must be submitted through Canvas. You can scan and upload handwritten notes or submit typed documents.

Homework sets are designed to be lean with minimized overlap. To help improve your exam performance, you may consider practicing additional homework problems beyond what is assigned.

**Exam:**

There are three midterm exams. There is no final exam. The semester project serves as the cumulative assessment for the course.

Exam policy: Exams are timed, and are to be completed synchronously. A pdf will be made available with all exam problems, and students will need to complete the exam within the allotted time and submit via Canvas. Students can complete the exams on paper and upload a scanned copy as their submission, or if preferred a stylus/tablet may be used to generate the exam solution file. Students will be asked to sign an academic integrity statement for each exam. Exams are open book and open note, but students must not seek or receive help from anyone other than the instructor or TA in completing their exams. Exams will be designed such that students will need to manage their time efficiently. Preparing notes ahead of time to aid efficient retrieval of information (e.g., summary notes with important formulas, concepts, and references), as well as a strategy for solidifying knowledge, is highly recommended.

Exam Style: Exams will consist of both short-answer questions designed to evaluate your conceptual understanding of the material, as well as one or more quantitative problems that are similar to homework problems. If you understand the material well, you should be able to answer most-shorted questions quickly. Pace yourself on short-answer questions. Some students make the mistake of spending too much time or writing too much in response to these questions, and run out of time to finish the exam.

**Class participation:**

Class participation will be assessed by the completion of in-class activities, and instructor evaluation. A few class activities are announced ahead of time, and count toward your grade. Most in-class activities, however, will not be announced. These are in-class quizzes and usually completed working together with other students in class. Unannounced class activities take 10% of your class participation grade. There is no make up permitted for unannounced activities.

**Term Project:** Semester project information forthcoming.

**Grading:** The overall grade of the course will be assembled based on

35%: Homework

35%: Exams

20%: Course Project

10%: Class Participation

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| --- | --- | --- |
| A+: 97 – 100% | A: 93 – 96% | A-: 90 – 92% |
| B+: 87 – 89% | B: 83 – 86% | B-: 80 – 82% |
| C+: 77 – 79% | C: 73 – 76% | C-: 70 – 72% |
| D+: 67 – 69% | D: 63 – 66% | D-: 60 – 62% |

**Academic Integrity:**

We will follow university regulations for academic integrity: (<http://admin.illinois.edu/policy/code/>). Students who violate academic integrity will receive a “0” on that exam or assignment and may receive an “F” grade in the course. Discussing a homework assignment in a group is encouraged as long as each student writes the answer in his/her own words. Plagiarism is considered a serious violation of academic integrity and will be dealt with utmost severity.

**Re-grade Policy:**

If you believe a mistake has been made in the grading of a homework or exam, please prepare a written description of this mistake along with the assignment or exam and submit either to the instructor or to TA within one week of receiving your grade. The instructor reserves the right to re-grade the entire assignment or exam when submitted for consideration of a re-grade.

**Schedule Overview:**

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| Week | Date | Topics |
| 1 | 8/26 | Introduction to design, failure theories (HW1) |
| 2 | 9/2 | Bulking (HW2) |
| 3 | 9/9 | Fatigue (HW3) |
| 4 | 9/16 | Shaft design (HW4) |
| 5 | 9/23 | Shaft design (HW5) |
| 6 | 9/30 | Exam 1 |
| 7 | 10/7 | Bolted joints (HW6) |
| 8 | 10/14 | Gear design (HW7) |
| 9 | 10/21 | Gear design |
| 10 | 10/28 | Bearings (HW8) |
| 11 | 11/4 | Introduction to steel structure design, tension members (HW9) |
| 12 | 11/11 | Exam 2, tension members |
| 13 | 11/18 | Beams (HW10) |
| 14 | 11/25 | Thanksgiving break |
| 15 | 12/2 | Beams |
| 16 | 12/9 | Review, Exam 3 (12/11) |

**Resources for Students with Disabilities:**

To obtain disability related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 3334603, email **disability@illinois.edu** **(mailto:disability@uiuc.edu)** or go to the **DRES website (http://disability.illinois.edu/)**. If you are concerned, you have a disability related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting “Sign Up for an Academic Screening” at the bottom of the page.