

# CE 4430 – Structural Engineering

Fall Semester 2026

## GENERAL COURSE INFORMATION

- **Credit Hours:** 3
- **Location:** 1212 Patrick F. Taylor Hall
- **Time:** Tuesday, Thursday | 3:00 PM – 5:50 PM

### Communication-Intensive (C-I) Course

Through the Geaux Communicate initiative, LSU provides opportunities to help you develop essential communication skills for success in college and beyond. This C-I course allows you to learn, practice, receive feedback, and apply written and spoken communication skills through communication-centered activities and assignments, accounting for at least 40% of your grade. This course is a stepping stone towards the LSU Communicator Certificate and LSU Distinguished Communicator Medal program. CxC Studios offer resources to enhance your communication abilities further. Visit [www.cxc.lsu.edu](http://www.cxc.lsu.edu) for more information.

## CATALOG DESCRIPTION

Fundamental principles applied to planning, analysis, and design of structures; introduction to computer-aided design approach to solving structural engineering problems using mainframe and microcomputer software.

### Prerequisites:

CE 4750, CE 4400, and CE 4410 or equivalent.

### Prerequisites by Topic

1. Design of steel elements
2. Load cases and load combinations
3. Structural analysis of statically determinate structures
4. Basic knowledge of CAD drawing

5. Basic knowledge of word processing and spreadsheet programs (e.g., MS Word and Excel)

## PURPOSE OF COURSE

The primary purpose of the course is to build on the conceptual design developed previously in CE 4750 to produce final design documents. These documents will include construction drawings, a design report, quantities, and a cost estimate.

## INSTRUCTOR AND CONTACT INFORMATION

- **Instructor:** Dr. Aly Mousaad Aly
- **Office:** 3230H Patrick F. Taylor Hall
- **Email:** [aly@lsu.edu](mailto:aly@lsu.edu)
- **Phone:** 225-578-6654

## TEXT AND REFERENCE MATERIALS

1. AISC (2017). Steel Construction Manual, 15th Edition. American Institute of Steel Construction, Chicago, IL. ISBN 1-56424-007-1.
2. AISC (2016). Specification for Structural Steel Buildings, ANSI/AISC 360-16. American Institute of Steel Construction, Chicago, IL.
3. ASCE (2017). Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE 7-16. American Society of Civil Engineers, Reston, VA.
4. ASCE (2010). Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10. American Society of Civil Engineers, Reston, VA. (*Primary reference – in-class examples will follow this edition.*)
5. ASCE (2016). Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE/SEI 7-16. American Society of Civil Engineers, Reston, VA. (*Students may alternatively use this edition.*)

## ANTICIPATED TIME COMMITMENT

Each student is expected to devote between 80 to 120 hours on the project. This time does not include studying time and time spent on homework. Student teams for the completion

of the design reports and design drawings will be formed before the end of the second week of lectures.

## GRADES

Grades will be based on the sum of points obtained in each of the following categories:

| Category                                | Points     |
|-----------------------------------------|------------|
| Design Report (including design output) | 35         |
| Design Drawings                         | 25         |
| Periodic Assignments                    | 20         |
| Peer Evaluation of Performance          | 10         |
| Class Attendance and Participation      | 10         |
| <b>Total</b>                            | <b>100</b> |

The final grade for the course will be assigned on the basis of the following scale:

- 100-97.0: A+
- 96.9-93.0: A
- 92.9-90.0: A-
- 89.9-87.0: B+
- 86.9-83.0: B
- 82.9-80.0: B-
- 79.9-77.0: C+
- 76.9-73.0: C
- 72.9-70.0: C-
- 69.9-67.0: D+
- 66.9-63.0: D
- 62.9-60.0: D-
- $\leq 59.9$ : F

Points for the design report and drawings will be assigned to the project as a whole team, but may or may not be uniformly given to all members of the team. Roughly, 75 percent will be based on the overall quality and 25 percent will be based on the specific specialty area within which each student has given most of his/her effort. Students will receive a zero grade if they have not sufficiently contributed to their group efforts for a given intermediate and/or final report. Intermediate reports are due online approximately every month and the final report and drawings are due on the final day of class.

### Monthly Progress Reports

Each design team will be required to submit formal progress reports every month as indicated in the schedule. These reports shall include but not necessarily be limited to individual tasks; estimated completion dates; progress to-date; a summary of any major accomplishments and/or problems.

### Biweekly Team Work Logs

Each team shall maintain a log containing dates, work times and work activities of each member in the group. These logs will be collected online every 2 weeks to evaluate group performance and progress.

### Periodic Assignments

Periodic (usually bi-weekly) assignments requiring the use of CAD, finite element programs, design codes and hand calculations will be handed out in parallel with the development of the final project report. These assignments will cover topics and tools that will be relevant for the completion of the final project report. Assignments and due dates will be provided throughout the semester and will be posted on Moodle.

### Peer Evaluation

A confidential assessment of each team member's contribution to the project will be required from each student halfway through the course and at the end of the course. Individual results will not be shared with the class. However, comments will be considered when assigning each team member's individual grade for the final project. Your assessments must be made professionally and fairly; inflated or overly critical grades for your teammates will lower your own grade for this component of the course. Any serious concerns regarding another teammate's contributions to the team (e.g., tardiness, absences) must be addressed with the instructor before the peer evaluation is completed.

## CLASS ATTENDANCE AND PARTICIPATION POLICY

Attendance is mandatory for CE 4430. 10% of the final grade will be based on attendance and active participation in class.

- **Attendance:** Students must attend all scheduled classes. Attendance will be taken via sign-in sheet. Unexcused absences will result in a deduction from the participation grade.
- **Participation:** Active engagement in discussions, asking and answering questions, and collaboration with peers is expected. The instructor will assess each student's level of participation.

The participation grade will be calculated based on attendance (sign-in sheet) and the instructor's assessment of each student's active participation in class.

## INSTRUCTOR'S ROLE

The instructor will be available to provide guidance, instructions and mentoring in the project, and to assign grades. The goal is to encourage independent student effort and leadership. Project consultants to assist in specific technical matters will be identified as needed. The instructor and students will meet at the beginning of each class period to discuss any management or technical problems associated with the project.

## QUALITY CONTROL

Professional level work is expected and quality control of all project products is essential. Particular attention will be given to design calculations. All calculations should be neatly and logically organized and contain full documentation of sources of information. Calculations performed by one team member shall be checked and approved by another team member and signed by both. Drawings shall be checked by the team for completeness and quality. Whereas all members of the team are responsible for their individual work, the Project Manager will have overall responsibility for quality control for the team.

## COMPUTER UTILIZATION

Students are encouraged and expected to utilize appropriate and available computer analysis and design software. All plans should be produced using CAD software.

## ANTICIPATED ABET COURSE OUTCOMES

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## PROJECT DELIVERABLES

The project will be delivered in four stages over the course of the semester, each building on the chapters and appendices below:

- **Project Report:**
  - **1st Project Report**
    - \* Ch. 1: Introduction & Description of Structure
    - \* Ch. 2: Previous Work
    - \* Ch. 3: Non-structural Design Considerations
    - \* Ch. 4: Space and Layout Requirements
    - \* Ch. 5: References
    - \* Appendix A: Live Load Reduction Calculations
    - \* Appendix B: Wind Load Calculations
    - \* Appendix C: Notional Load Calculations
    - \* Appendix D: Filler Beam Design Calculations
    - \* Appendix E: Metal Deck Design Calculations
  - **2nd Project Report**
    - \* Ch. 6: Load Cases
    - \* Ch. 7: Load Combinations
    - \* Ch. 8: Design Parameters
    - \* Appendix F: FE Input File (with comments)
    - \* Appendix G: FE Output
    - \* Appendix H: Slab-on-Grade Calculations
  - **3rd Project Report**
    - \* Ch. 9: Analysis and Design
    - \* Ch. 10: Design Summary
    - \* Appendix I: Shear Connection Design
    - \* Appendix J: Moment Connection Design
    - \* Appendix K: Bracing Design
  - **Final Project Report**
    - \* Ch. 11: Summary of Cost Estimate
    - \* Appendix L: Base Plate and Anchor Bolt Design

- \* Appendix M: Footing Design
- \* Appendix N: Cost Estimate Calculations

- **Report Drawings:**

- General Notes
- Building Layout (2 floors)
- Steel Deck
- 2nd Floor Plan
- Roof Plan
- Building Sections (2, one in each direction)
- Slab-on-ground
- Shear Connection Details
- Moment Connection Details
- Bracing Details
- Base Plate Details
- Foundation Plan (footing location and dimensions)
- Footing Details

- **Checked Calculations and Drawings:**

- Both the Designer and the Checker shall write their names on each set of calculations and drawings. Failure to do so will incur in grade deductions.

## STUDENT SUPPORT & UNIVERSITY POLICIES

- **Disability Services:** Students needing accommodations should register with the LSU Office of Disability Services and inform the instructor as early in the semester as possible.
- **Title IX:** LSU is committed to providing an environment free from discrimination, harassment, and retaliation.
- **Mental Health & Wellness:** The LSU Student Health Center and the Lighthouse Program offer free, confidential counseling and crisis support to all students.
- **Syllabus Changes:** This syllabus is subject to change with reasonable notice to accommodate the needs of the class or unforeseen circumstances.

## ACADEMIC DISHONESTY AND ETHICS

Unless otherwise stated, periodic assignments are to be completed on an individual basis. Design reports and design drawings are to be completed by each team of students as a whole. Sharing of segments of computer code, homework, or reports among individual students for the periodic assignments and among the different groups for the final design report is not permitted. Group discussions are allowed, but performing the actual engineering analyses, making design choices, writing computer programs, and preparing reports/assignments is the responsibility of each individual. Plagiarism and cheating will not be tolerated.

A policy statement on academic honesty in all credit assignments is provided to the students enrolled in this course. It is expected that you understand and agree to abide by the policies explained in class materials and detailed in the Code of Student Conduct. In accordance with the Code of Student Conduct, all matters concerning academic dishonesty or computer abuse may be turned over to the Dean of Students Office.

### Policy Statement on Academic Honesty in All Credit Assignments

It is the function of universities to educate professionals. During your tenure at LSU, it is expected that you adopt professional standards which you will retain for the remainder of your professional life. Historically, all work represented as original work has been protected by a code of professional behavior (ethics) which holds that one may not borrow from the work of others without permission, nor even refer to their work without a full and complete reference to them as the authors. To do so is essentially an act of intellectual theft. Plagiarism is a violation of this ancient concept. A degree awarded by LSU is a statement to others that an individual has achieved a level of professionalism and has demonstrated a belief in the ethical standards demanded of all professions.

Another tenet of the code of ethics is that professionals assume full responsibility for the integrity and authenticity of their work. It is therefore incumbent upon each individual to be cautious to insure the security, authenticity, and accuracy of their professional work. Unless otherwise specifically stated, software, models, visual imagery, written assignments, etc. submitted for credit are expected to be solely the work of the individual student submitting the assignment and are thereby covered by this code of ethics.

If, in the view of the instructor, problem solutions were not developed independently, the students involved will be charged with violation of the Code of Student Conduct. According to University policy, both the giver and the receiver of information, if such distinction exists, are equally guilty and receive like sanctions. The sanctions prescribed for these offenses may also be found in the Code of Student Conduct. Copies of this document are available from the office of the Dean of Students or from the LSU website. Your instructor does not object to general discussion of concepts and methodologies, but the sharing of programs, sections of programs, written derivations or descriptions of algorithms or documentation without prior written approval is considered unacceptable collaboration and is strictly

prohibited. Use of homework/test assignments and their solutions from previous years as a study guide is not allowed unless the material is directly provided to you by your instructor. If in doubt, ask your instructor.

Assignments do not have to be identical line for line or word for word to be considered evidence of unacceptable collaboration between students. Merely changing variable names, labels, comments or spacing should not be expected to disguise, from either the instructor or members of a Student Conduct Hearing Panel, the fact that unacceptable collaboration has occurred. It is also the responsibility of each student, insofar as the student has control, to ensure that his or her work does not fall into the hands of other students (e.g. program listings should not be left in places that are easily accessible to other students). Students are encouraged to keep dated copies of partially-worked problems in order to be able to document their progress on the assignments. In addition to the above, any alteration of output, in any manner (such as changing the date, changing program results, etc.) is also considered to be a misrepresentation of one's professional work and is thereby academic dishonesty.

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