

# Analysis and Design in Steel

CES 4605

**Class Periods:** MWF / Period 3 / 9:35AM – 10:25AM

**Location:** Computer Science and Engineering Building (CSE) Room E220

**Academic Term:** Fall 2024

## **Instructor:**

Brian M. Phillips, Ph.D., P.E.

Office Hours: TBD

## **Course Description**

Elastic and plastic theories of design; design of members subjected to tension, compression, flexure, and torsion; design of connections and rigid frames.

## **Course Pre-Requisites**

CES 3102, CGN 3501C, and engineering major.

## **Course Objectives**

This course provides an introduction to structural steel design focusing on load and resistance factor design (LRFD) philosophy.

This course will enable students to:

1. Understand and apply the theoretical background and experimental behavior of structural steel members, connections, and frames
2. Design and analyze structural steel members, connections, and frames using standardized building codes and design specifications
3. Use structural analysis computer programs as design aids

## **Professional Component (ABET):**

CES 4605 is an advanced elective course in the BS Civil Engineering Curriculum. It satisfies the additional Design Elective requirement and therefore meets the requirement in the Civil Engineering Program Criteria that students design in more than one civil engineering context.

## **Relation to Program Outcomes (ABET):**

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
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	High
3. An ability to communicate effectively with a range of audiences	Medium
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	Low
5. An ability to function effectively on a team whose members together provide leadership, create a	High

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	Medium

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

### **Required Textbook**

- Title: Steel Construction Manual, 16th Ed. (Print)  
Author: American Institute of Steel Construction  
Publication date and edition: 2023  
ISBN 978-1-56424-116-0

This manual is necessary to complete homework assignments, in-class exercises, the design project, and the exams. To purchase the manual at a reduced cost, follow the instructions posted on Canvas.

### **Recommended Materials**

- Title: Steel Design  
Author: Segui, William T.  
Publication date and edition: 2017, 6<sup>th</sup> Edition  
ISBN number: 978-1337094740

### **Suggested References**

- Title: Steel Structures: Design and Behavior  
Authors: Salmon, Charles G., John E. Johnson, and Faris A. Malhas  
Publication date and edition: 2009, 5<sup>th</sup> Edition  
ISBN number: 978-0131885561
- Title: Structural Steel Design  
Authors: McCormac, Jack C. and Stephen F. Csernak  
Publication date and edition: 2017, 6<sup>th</sup> Edition  
ISBN number: 978-0134589657
- Title: Basic Steel Design with LRFD  
Authors: Galambos, Theodore V., F. J. Lin, and Bruce G. Johnston  
Publication date: 1996  
ISBN number: 978-0130595775

### **Course Schedule (Subject to Change)**

Week 1:	Introduction to structural steel
Week 2:	Introduction to structural steel design philosophies
Week 3:	Calculation of service and factored loads on structural members
Week 4:	Behavior and design of tension members
Week 5:	Behavior and design of tension members
Week 6:	Behavior and design of tension members
Week 7:	Behavior and design of compression members
Week 8:	Behavior and design of compression members
Week 9:	Behavior and design of flexural members
Week 10:	Behavior and design of flexural members

- Week 11: Behavior and design of flexural members  
Week 12: Behavior and design of beam-column members  
Week 13: Behavior and design of beam-column members  
Week 14: Behavior and design of welded and bolted connections

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>).

### ***Homework***

Homework will consist of design and analysis problems of a smaller scope than the design project. Assignments are typically due one week after assigned and must be uploaded to Canvas by 11:59PM on the due date. Late homework will be accepted with a penalty of 25% per day. Homework must be completed and submitted individually, although you may consult your classmates for inspiration. If you consult with a classmate to complete the homework, you should write their name on the last page of the assignment. Copying is not permitted.

### ***In-class Exercises***

There will be periodic in-class exercises during the semester. The instructor will be available to answer questions and provide guidance. You are encouraged to work with your classmates during these exercises. The exercises are designed to be completed during class and must be uploaded to Canvas by 11:59PM on the date they are assigned.

### ***Design Project***

The design project presents students with a realistic structure that must be designed to meet criteria established by the owner in accordance with standardized building code and design specifications. The project is divided into four submittals, each of which builds upon the work of the previous submittal. Project submittals must include a professional cover letter summarizing the submittal including any major findings. Because these submittals will be somewhat lengthy, organization and presentation is critical. You will be divided into groups of 3 to 4 members. Submittals (one per group) must be uploaded to Canvas by 11:59PM on the due date. You may ask for advice from outside your group, but all calculations and designs should be done with your group alone. Copying is not permitted. The same late policy for homework applies to design project submittals.

### ***Exams***

There are three exams spaced throughout the semester. Make-up exams will not be given unless prior coordination is made with the instructor or in extreme situations that are consistent with university policies found in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and with appropriate documentation.

### ***Standards for Written Work (Homework and Design Project)***

In this class you are expected to show a high level of professionalism through your submitted work. The work of a practicing engineer is always checked independently by other engineers and thus you must adopt and maintain very high standards of quality. You need to be able to communicate to your subcontractors, colleagues, and superiors exactly how and why you performed each step.

For all submitted work, the following guidelines must be followed. Failure to do so will result in significant point reductions.

1. No sloppy work. Regardless of achieving a correct solution, sloppy or unclear work is unprofessional and can lead to misunderstandings.
2. Use engineering paper. All hand calculations should be done on engineering paper.
3. Show your work. Your calculations must be clear and follow a logical step-by-step progression.
4. Justify your work. Any decisions or assumptions should be accompanied by an explanation.
5. Include detailed technical drawings. If technical drawings will help the reader understand a stage in the design or analysis process, include it.

6. Include problem statements. Summarize the problem statements or design objectives before proceeding.
7. Box or underline your final answers. Include a concluding sentence or two, if appropriate.
8. Work submitted online should be assembled into a single PDF file made from high-quality scans. The page dimensions should be 8.5 x 11 inches (or 11 x 8.5 inches).

### ***Evaluation of Grades***

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Homework and Short Exercises	30%
Design Project Submissions	25%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Total	100%

### ***Grading Policy***

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
93.3 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 90.0	B+	3.33
83.3 - 86.7	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 80.0	C+	2.33
73.3 - 76.7	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 70.0	D+	1.33
63.3 - 66.7	D	1.00
60.0 - 63.3	D-	0.67
0 - 60.0	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### ***In-Class Recording***

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil

proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

## **Campus Resources:**

### Health and Wellness

#### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](#), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

#### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

#### **COVID-19**

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: <https://care.dso.ufl.edu>.

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.