

# CES 4605: Analysis and Design in Steel Fall 2019

## Instructor

M. Davidson, PhD, PE | [michael@ce.ufl.edu](mailto:michael@ce.ufl.edu)

## Meetings

M,W,F | Period 2 (8:30 AM - 9:20 AM), Little Hall, Rm. 121

## Office Hours

M, W | 12 PM to 1 PM, WEIL 475F

## Class Website

E-learning <https://elearning.ufl.edu/>

## Pre-requisites

CES 3102 and CGN3501

## Required Texts

AISC Steel Construction Manual, 15<sup>th</sup> Ed.  
Segui, Steel Design, 6<sup>th</sup> Ed., CL Engineering

## Online Resources

<http://www.aisc.org>

<https://www.aisc.org/content.aspx?id=28100>

American Institute of Steel Construction  
Steel Construction Manual Resources

## Fall 2019 Catalog Description

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

## Course Objective

Introduction to the fundamentals of structural steel design using current design specifications.

## Topics

1. Codes and specifications: building codes, model codes, design specifications, design philosophies, AISC LRFD.
2. Loads: load types, load combinations, SBC, ASCE 7, tributary areas, tracing loads, live load reduction.
3. Steel: properties and characteristics of structural steel.
4. Tension members: tension connections, shear lag, member design.
5. Bolted connections: failure modes, high-strength bolts, combined shear and tension.
6. Welded connections: welding techniques, fillet weld connections.
7. Columns: global and local buckling, column curves, effective length factors.
8. Beams: stability, compact vs. noncompact, braced length, bending strength, shear strength, deflection.

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9. Beam-columns: interaction eqns., moment amplification,  $P_1$  and  $P_2$ , B1 and B2, braced vs. unbraced frames
10. (time permitting) Plastic design: plastic hinge, collapse mechanisms, collapse loads, AISC requirements.

### Course Structure and Attendance

This class meets three times per week, 50 minutes per class period. Each period will start with a brief review of previous material and/or questions on homework, followed by a lecture on new material. Quizzes will be given per the tentative schedule below. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. Regular attendance is strongly recommended for success in this course. While attendance does not make up a specific component of the course grade, it will be reflected in homework and quiz grades.

### Evaluation Process

**Homework (15%):** Six homework assignments will make up 15% of your final grade. Six problem sets will be assigned throughout the semester and will be due at the time of a quiz given on the same material (see below). Homework assignments will be posted on the course website. Homework must be submitted on engineering paper with a clearly defined problem statement, given information, required information, and clearly indicated solution(s). Homework that cannot be read will not be graded. All solutions must have correct units and clear directions of loads/forces/moments indicated; solutions without correct units or unclear orientations will be penalized. Assignments are due at the beginning of class (8:30 AM) on the due date.

- Late homework will not be accepted and will receive a grade of zero.
- The lowest homework grade will be dropped. This policy removes the need for make-up homework caused by unplanned or conflicting events, illness, etc. No make-up homework will be given.

**Quizzes (60%):** Five in-class quizzes will comprise 60% of your final grade. The quizzes will require use of the (hardcopy) AISC manual, and no sharing of manuals will be permitted. All work and solutions (with correct units and directions) are to be shown on the quiz in the space provided. Students who must miss a quiz due to University approved business should notify the instructor in advance with a written explanation for the absence along with the appropriate documentation. Quizzes will not be returned, but grades will be posted on Canvas. If you wish to review your graded quiz, you may do so during office hours, but you may not take or otherwise remove or copy the quiz.

- The lowest quiz grade will be dropped. This policy removes the need for make-up quizzes caused by unplanned or conflicting events, illness, etc. No make-up quizzes will be given. In order for the last quiz (#5) to be dropped, you must score higher than a 60% on that quiz.

**Final Exam (25%):** A cumulative final exam will be held on Thur. 12/12/2019 from 12:30 PM to 2:30 PM and will comprise 25% of your final grade. All work and solutions (with correct units and directions) are to be shown on the exam in the space provided. Students who must miss the cumulative final exam due to University approved business should notify the instructor at least three weeks in advance with a written explanation for the absence (with appropriate documentation). Otherwise, no make-up exams will be given.

Grading Policy

Percent	Grade	Grade Points
93.0 – 100	A	4.00
90.0 – 92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 – 86.9	B	3.00
80.0 - 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 - 76.9	C	2.00
70.0 - 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

The instructor reserves the right to adjust the grade distributions. Grades **will not** be adjusted for individuals. However, a course project will be assigned, and will be graded for up to 3% credit. More information on UF grading policy may be found at:

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

**Student Grade Appeals**

To adequately address grade appeals on homework assignments and quizzes, they will not be discussed at the start, during, or at the end of the class period. Students may submit a written (typed) memo to Dr. Davidson (in class or via e-mail) within two class periods of when the grade is posted. The memo must clearly state the reason for appealing the grade as well as a proposed solution.

**Calculators**

Only NCEES approved calculators may be required during quizzes. If you are caught using a non-approved calculator when NCEES approved calculators are required, your quiz will be collected and your grade will be a zero.

- If you are unsure about your calculator, it is your responsibility to check with the NCEES website for approval. Calculators will not be provided if you forget or bring the wrong calculator.

**Other Electronic Devices**

The use of any electronic device, except an approved calculator, is not permitted during quizzes. Your quiz will be collected and your grade will be a zero if you are caught using a non-approved electronic device. Phone use of any kind is not permitted during lectures or quizzes. Please turn your phone off or to a silent ring and refrain from using it during class.

**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,

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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.

### **Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### **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. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others. Academic dishonesty will not be tolerated, and failure to comply with this commitment will result in disciplinary action. Ignorance provides no protection from the consequences.

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

### 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://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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

### **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)

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• Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

**Course Schedule (tentative)**

Class No.		Date (m/d)	Topic	Reference	HW
1	W	8/21	Introduction	Syllabus; Chapter 1	
2	F	8/23	Loads; Steel Properties and Shapes	Chapter 1	Assigned: 1
3	M	8/26	No lecture		
4	W	8/28	Observation of "The Steel Structure" in front of Weil Hall	Links to resources will be posted on CANVAS	
5	F	8/30	Introduction to LRFD and ASD	Chapter 2	
6	M	9/2	<i>No Class: Labor Day</i>		
7	W	9/4	<i>No Class: Hurricane Dorian</i>		
8	F	9/6	Tension Members: Net Area	Chapter 3 (3.1-3.2)	Assigned: 2
9	M	9/9	Tension Members: Effective Area	Chapter 3 (3.3)	
10	W	9/11	Tension Members: Staggered Fasteners	Chapter 3 (3.4)	
11	F	9/13	Tension Members: Block Shear Rupture	Chapter 3 (3.5)	
12	M	9/16	Design of Tension Members	Chapter 3 (3.6)	
13	W	9/18	Tension-Threaded Rods and Cables	Chapter 3 (3.7)	
14	F	9/20	<b>Quiz 1: Steel, Loads, Codes, and Tension Members</b>		Due: 1, 2
15	M	9/23	Bolted Connections	Chapter 7 (7.1-7.2)	Assigned: 3
16	W	9/25	Shear Strength	Chapter 7 (7.4)	
17	F	9/27	Slip-Critical Connections	Chapter 7 (7.6)	
18	M	9/30	Welded Connections	Chapter 7 (7.10)	
19	W	10/2	Fillet Welds	Chapter 7 (7.11)	
20	F	10/4	<i>No Class: Homecoming</i>		
21	M	10/7	Quiz 2 review	Chapter 7	
22	W	10/9	<b>Quiz 2: Connections</b>		Due: 3
23	F	10/11	Introduction to Columns	Chapter 4 (4.1-4.3)	Assigned: 4
24	M	10/14	Local Stability and Design	Chapter 4 (4.4-4.7)	
25	W	10/16	Column Design example	Chapter 4	Assigned: Project
26	F	10/18	Introduction to Flexural Members	Chapter 5 (5.1-5.3)	Assigned: 5
27	M	10/21	Laterally Braced Beams - Part 1	Chapter 5 (5.4-5.5)	
28	W	10/23	Quiz Review	Chapter 4	
29	F	10/25	<b>Quiz 3: Columns</b>		Due: 4
30	M	10/28	Laterally Braced Beams - Part 2	Chapter 5 (5.5-5.6)	

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31	W	10/30	Laterally Unbraced Beams	Chapter 5 (5.6-5.7)	
32	F	11/1	Laterally Unbraced Beams, Deflection, and Design	Chapter 5 (5.7,5.9)	
33	M	11/4	Shear and Deflection	Chapter 5 (5.8)	
34	W	11/6	Floor Framing Systems	Chapter 5 (5.10-5.11)	
35	F	11/8	Quiz Review	Chapter 5	
36	M	11/11	<i>No Class: Fall break</i>		
37	W	11/13	<b>Quiz 4: Beams</b>		Due: 5
38	F	11/15	Introduction to Beam-Columns	Chapter 6 (6.1-6.3)	Assigned: 6
39	M	11/18	Moment Amplification	Chapter 6 (6.3-6.4)	
40	W	11/20	Braced and Unbraced Frames - Part 1	Chapter 6 (6.5-6.6)	
41	F	11/22	Braced and Unbraced Frames - Part 2	Chapter 6 (6.5,6.7)	
42	M	11/25	Beam-Columns – Design	Chapter 6 (6.8)	
43	W	11/27	<i>No Class: Thanksgiving</i>		
44	F	11/29	<i>No Class: Thanksgiving</i>		
45	M	12/2	Quiz 5 review	Chapter 6	
46	W	12/4	<b>Quiz 5: Beam-Columns</b>		Due: 6, Project
47	F	12/6	<i>No class: Reading Day</i>		
48	M	12/9	<i>No class: Exam week</i>		
49	T	12/12	<b>Final Exam: Cumulative (12:30 PM - 2:30 PM)</b>		