

**UNIVERSITY OF CALIFORNIA – BERKELEY**  
**Department of Civil and Environmental Engineering**  
**CE247-DESIGN OF STEEL AND COMPOSITE STRUCTURES**



Golden Gate Bridge, Photo by A. Astaneh



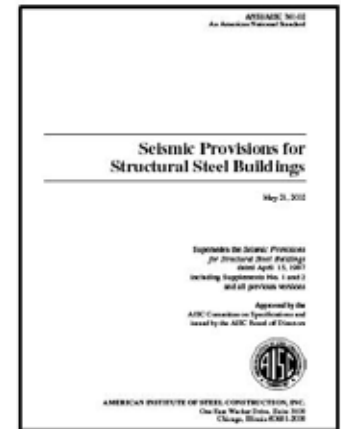
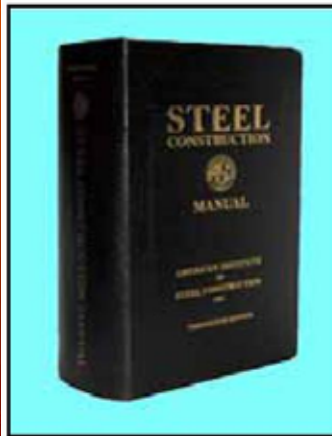
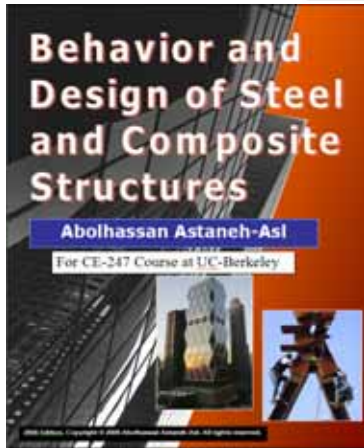
Bolted moment connection



Shanghai World Financial Center, Illustration: ASCE-CE Magazine Model by Rod Weaver and Keisuke Hei- Photograph by Jock Pottle

**Faculty: Abolhassan Astaneh-Asl, Ph.D., P.E.**  
**Faculty Office Hours: MF 10:10-11:00**  
**Faculty Office; 781 Davis Hall**

**Required Textbook and the AISC Specifications**



**General Information**

**General Catalogue Description:**

Behavior and design of steel plate girders and shear walls. Design of bracings for stability. Design of members subjected to torsion. Design of composite beams, columns, and beam-columns. Behavior and design of shear, semi-rigid and moment connections. Concepts used in design of gusset plates and base plates. Selection and design of steel and composite systems.

**Required Book:**

1. **“Behavior and Design of Steel and Composite Structures”**, by Abolhassan Astaneh-Asl, 2008 Edition for CE247. This is a textbook in its final stages of preparation for printing. Chapters of the book (in PDF format) ,which covers CE247 syllabus, will be posted on the course web site at ([www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)) throughout the semester for free download of students enrolled in CE247. The lectures will follow this document.
2. **“AISC Steel Construction Manual-2005”** This is the latest Steel Construction Manual released by the American Institute of Steel Construction (AISC) in 2006 and supersedes all other AISC Manuals. Students enrolled in steel design courses in U.S. can purchase this Manual for a student price of \$120. The faculty

teaching the course sends the student payment to the AISC and receives the copy to be given to the student. More details will be provided in class.

3. **“Specification for Structural Steel Buildings-2005 and Commentary”** This is the most current Specification that governs design of steel structures. A copy of this document (in PDF) format can be freely down loaded from <http://www.aisc.org/> or form the CE247 course page at ([www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)).
4. **“Seismic Provisions for Structural Steel Buildings-2005 and Commentary”** This is the most current Specification that governs *seismic* design of steel structures. A copy of this document (in PDF) format can be freely down loaded from:<http://www.aisc.org/> or from the CE2472 course page at ([www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)).

### Other Free Download Documents Used or Referred to in the Course

5. **“Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications”**, ANSI/AISC 358-05, An American National Standard, A copy of this document (in PDF) format can be freely down loaded from <http://www.aisc.org/> or form the CE247 course page at [www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)
6. **“Sections from “FEMA 350 Series”** reports will be used during the semester. The reports can be downloaded free of charge from [www.fema.gov](http://www.fema.gov) or CE247 course page at [www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)
7. **“Specification for Structural Joints Using ASTM A325 or A490 Bolts”**, developed by the Research Council on Structural Connections and published by the AISC. A copy of this document (in PDF) format can be freely down loaded from <http://www.aisc.org/> or form the CE247 course page at [www.ce.berkeley.edu/~astaneh](http://www.ce.berkeley.edu/~astaneh)

### Suggested References

1. **“Minimum Design Loads for Buildings and Other Structures”**, ASCE Standard number SEI/ASCE 7-05, American Society of Civil Engineers, Reston, VA.
2. **“Connections in Steel Structures-IV, Behavior, Strength and Design”**, Proceedings of a 2000 conference. This document can be downloaded, free of charge, from the AISC web site: [www.aisc.org](http://www.aisc.org), “Free Downloads”.
3. **“Composite Construction, Design for Buildings”**, a book by Viest et al., 1997, ASCE/McGraw-Hill, Inc.
4. **“Handbook of Structural Steel Connection Design and Details”** Edited by Akbar Tamboli, McGraw Hill Inc.
5. **“Guide to Design Criteria for Bolted and Riveted Joints”**, Second Edition, G.L. Kulak, J.W. Fisher and J. H. A. Struik, Published by the AISC, [www.aisc.org](http://www.aisc.org).

### Homework:

Homework assignments will be given during the semester and are due at the beginning of the class on the due date. Late homework solutions will not be accepted. Please submit your solution to the homework sets on “engineering pad” paper, write neatly and draw the sketches using a straightedge. Solutions to homework sets will be posted on the web page <http://ce.berkeley.edu/~astaneh>. Please make sure we have your e-mail address correctly. If you did not receive this page via e-mail prior to first lecture, then we don’t have your correct e-mail address. Please send an e-mail as soon as possible to [astaneh@ce.berkeley.edu](mailto:astaneh@ce.berkeley.edu) with subject: “CE247- E-mail address”.

### Examinations:

There will be one midterm examination on the date indicated in the next page. If for documented personal or family emergencies, you cannot take the mid-term exam, the grade for your missed mid-term will be assigned as the same grade as your grade in the final exam. Midterm exam missed without justification will be assigned a zero grade. All exams are open book.

### Grading:

Homework will count 20%; mid-term exam 35% and final 45% of the final course grade.

### Prerequisites for CE 247:

An undergraduate course in Design of Steel Structures (such as CE122 at UC-Berkeley)

## Summary of CE247 Course Content

Week	Day	Lecture Number	Topics
Jan 23	Wed.	1	Course Policies and Summary of Syllabus
Jan 25	Fri.	2	Chap. 1- LRFD, ASD, General Design Issues, Material Properties (Review).
Jan 28	Mon.	3	Chap. 4- Steel Tension Members (Review), Pin-Connected Members & Eye-bars
Jan 30	Wed.	4	Chap. 4- Seismic Issues,
Feb 1	Fri.	5	Chap. 4- Composite Tension Members
Feb 4	Mon.	6	Chap. 5- Steel Axially Loaded Columns (Review), Seismic Issues
Feb 6	Wed.	7	Chap. 5- Composite Axially loaded Columns,
Feb 8	Fri.	8	Chap. 5- Shear Studs, Load Transfer in Composite Columns
Feb 11	Mon.	9	Chap. 6- Steel Beams in Bending (Review)
Feb 13	Wed.	10	Chap. 6- Composite Beams in Bending,
Feb 15	Fri.	11	Chap. 6- Composite Beams in Bending, Seismic Issues
<b>Feb 18</b>	<b>Mon.</b>	-	<b>Presidents Day (Holiday), No Classes</b>
Feb 20	Wed.	12	Chap. 7- Steel Beams in Shear (Review), Tension Field Action and Plate Girders
Feb 22	Fri.	13	Chap. 7- Composite Beams in Shear
Feb 25	Mon.	14	Chap. 8. Steel Trusses and Truss Joists
Feb 27	Wed.	15	Chap. 9- Bracing for Lateral Stability of Columns
Feb 29	Fri.	16	Chap. 9- Bracing for Lateral Stability of Beams
Mar 3	Mon.	17	Chap. 10 – Torsion in Steel Members
Mar 5	Wed.	18	Chap. 10 – Torsion in Steel Members
Mar 7	Fri.	19	Chap. 10 – Torsion in Steel Members
Mar 10	Mon.	20	Chap. 11- Steel Members Subjected to Combined Loads (Review)
Mar 12	Wed.	21	Chap. 11- Composite Members Subjected to Combined Loads, seismic issues
Mar 14	Fri.	---	<b>Midterm Exam (Covers Chapters 4,5,,6,7, and 8 inclusive)</b>
Mar 17	Mon.	22	Chap. 12- Connectors in Steel and Composite Structures , Welds (Review)
Mar 19	Wed.	23	Chap. 12- Welds (Review)
Mar 21	Fri.	24	Chap. 13- Bolts (Review)
<b>Mar 24-28</b>	<b>Mon-Fr</b>	-	<b>Spring Recess, No Classes</b>
Mar 31	Mon.	25	Chap. 14- Shear Connections
Apr 2	Wed.	26	Chap. 14- Shear Connections
Apr 4	Fri.	27	Chap. 14- Seismic Issues in Shear Connections ( <i>AISC Conf., Nashville*</i> )
Apr 7	Mon.	28	Chap. 15- Moment Connections, Seismic Issues
Apr 9	Wed.	29	Chap. 15- Moment Connections, Seismic Issues
Apr 11	Fri.	30	Chap. 16- Semi-rigid Connections
Apr 14	Mon.	31	Chap. 16- Semi-rigid Connections
Apr 16	Wed.	32	Chap. 17- Gusset Plate Connections
Apr 18	Fri.	33	Chap. 17- Gusset Plate Connections, Seismic Issues
Apr 21	Mon.	34	Chap. 18- Column Base Plates for steel and composite columns
Apr 23	Wed.	35	Chap. 18- Column Base Plates and Column Splices, Seismic Issues
Apr 25	Fri.	36	Chap. 19- Design for Concentrated Forces ( <i>ASCE Str. Congress, Vancouver*</i> )
Apr 28	Mon.	37	Chap. 19- Design for Concentrated Forces
Apr 30	Wed.	38	Chap. 20- Steel and Composite Centrically Braced Frames
May 2	Fri.	39	Chap. 20- Steel and Composite Eccentrically Braced Frames
May 5	Mon.	40	Chap. 20- Steel and Composite Moment Frames
May 7	Wed.	41	Chap. 20- Steel Shear Walls
May 9	Fri.	42	Chap. 20- Composite Shear Walls
May 12	Mon.	43	Discussion of Final Exam and Course Evaluation

**Final Exam: Group 4, FRIDAY MAY 16, 2008 8-11A**

**Location of the final exam will be announced by the University during the last week of the semester.**

\* The lectures on April 4 and April 25 will be rescheduled to another date.