

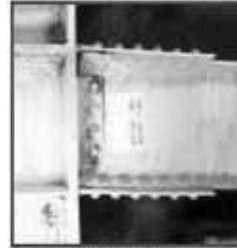
Final Version-Jan 29-2008

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

Course Web Site is at: <http://www.astaneh.net>



Golden Gate Bridge, Photo by A. Astaneh



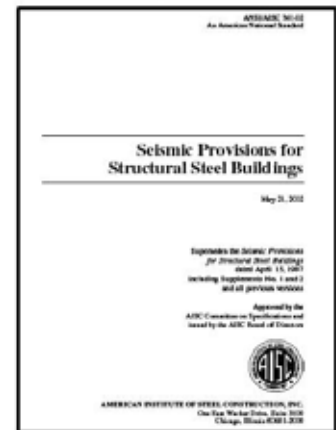
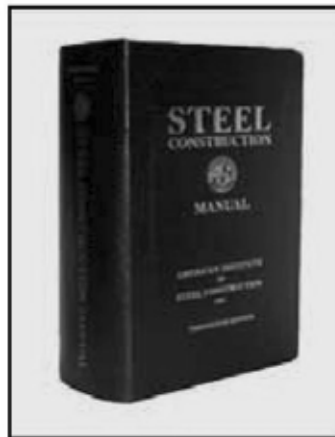
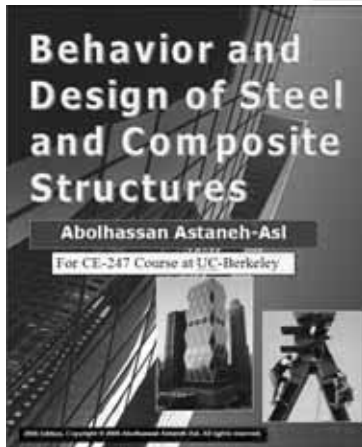
Bolted moment connection



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.
(O.H.:MF 10:30-11:30, at 781 Davis Hall)
GSI: Eric Keldrauk (O.H.: TBA)

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.astaneh.net) 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.astaneh.net.
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.astaneh.net.

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.astaneh.net.
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 or CE247 course page at www.astaneh.net
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.astaneh.net.

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, “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.

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 with subject: “CE247- E-mail address”.

Examinations:

There will be two midterms on the date indicated in the next page. If for documented personal or family emergencies, you cannot take a mid-term exam, the grade for your missed mid-term will be assigned as the same grade as your other midterm grade. If you miss a midterm for unjustifiable reasons the grade for missing midterm will be zero. The two midterms will be 90 minutes long (Friday from 8:20-9:50) and will be open book. There will be a Systems Design Project consisting of design of lateral load systems for an eight story building using the steel and composite systems discussed during the last 1/3 of the semester. There will be no final exam.

Grading Weights:

Homework will count 25%; each mid-term exam 25% and systems design assignment 30%.

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	Topics
Jan 23	Wed.	1	Course Policies and Summary of Syllabus
Jan 25	Fri.	2	Chap. 1- LRFD, ASD, General Design Issues, Material Properties .
Jan 28	Mon.	3	Chap. 4- Steel Tension Members (Summary, 20min), Pin-Connected Members & Eye-bars
Jan 30	Wed.	4	Chap. 4- Seismic Issues, Composite Tension Members, Tension Members in Bridges
Feb 1	Fri.	Discussion	HW1 Q/A, Case Studies and discussion of tension members behavior and design
Feb 1	Fri.	5	Chap 5- Steel Axially Loaded Columns (Brief Review), Seismic issues
Feb 4	Mon.	6	Chap. 5-Composite Axially loaded Columns,
Feb 6	Wed.	7	Chap. 5- Seismic Issues, Compression members in Bridges, HW1 due
Feb 8	Fri.	Discussion	HW2 Q/A, Case Studies and discussion of compression members behavior and design
Feb 8	Fri.	8	Chap. 6-Steel Beams (Summary) , Composite Beams
Feb 11	Mon.	9	Chap. 6- Composite Beams in Bending,
Feb 13	Wed.	10	Chap. 6- Composite Beams in Bending, Seismic Issues, HW2 due
Feb 15	Fri.	Discussion	HW3 Q/A, Case Studies and discussion of beams behavior and design
Feb 15	Fri.	11	Chap. 7- Steel Beams in Shear (Brief Review), Tension Field Action and Plate Girder design
Feb 18	Mon.	-	Presidents Day (Holiday), No Classes
Feb 20	Wed.	12	Chap. 8- Steel Trusses and Truss Joists HW3 due
Feb 22	Fri.	Discussion	HW4 Q/A , Case Studies and discussion of trusses in buildings and bridges, HW3 due
Feb 22	Fri.	13	Chap 9- Bracing for lateral stability
Feb 25	Mon.	14	Chap. 10 –Torsion in Steel Members
Feb 27	Wed.	15	Chap. 10 Torsion in Composite members, HW4 due
Feb 29	Fri.	Discussion	HW5 Q/A , Case Studies and discussion of bracing members and torsion,
Feb 29	Fri.	16	Chap. 11- Steel Members Subjected to Combined Loads (summary), Seismic Issues
Mar 3	Mon.	17	Chap. 11- Composite members subjected to combined loads , Seismic Issues
Mar 5	Wed.	18	Chap. 11- Seismic issues, beam-columns in bridges, HW5 due
Mar 7	Fri.	Discussion	Midterm I Exam (Covers Chapters 4-8 inclusive), Open book (8:20-9:50)
Mar 7	Fri.	19	Midterm I Exam (Covers Chapters 4-8 inclusive), Open book (8:20-9:50)
Mar 10	Mon.	20	Chap. 12-Connectors in Steel and Composite Structures , Welds (Review)
Mar 12	Wed.	21	Chap. 12-Welds (summary), HW5 due
Mar 14	Fri.	Discussion	HW6 Q/A , Case Studies and discussion of composite members subjected to combined loads
Mar 14	Fri.	22	Chap. 13- Bolts and rivets (Summary)
Mar 17	Mon.	23	Chap. 14-Shear Connections
Mar 19	Wed.	24	Chap. 14-Shear Connections, HW6 due
Mar 21	Fri.	Discussion	HW7 Q/A , Discussion of welds, bolts, rivets and shear connections
Mar 21	Fri.	25	Chap. 15- Moment Connections-Steel , Seismic Issues
Mar 24-28	Mon-Fr	-	Spring Recess, No Classes
Mar 31	Mon.	26	Chap. 15-Moment Connections-Steel -Seismic Issues
Apr 2	Wed.	27	Chap. 15-Moment Connections-Composite-Seismic issues, HW7 due
Apr 4	Fri.	Discussion	HW8 Q/A , Discussion of moment connections (AISC Conference, Astaneh plans to attend) *
Apr 4	Fri.	28	Chap. 16- Semi-rigid Connections (AISC Conference, Astaneh plans to attend) *
Apr 7	Mon.	29	Chap. 17-Gusset Plate Connections
Apr 9	Wed.	30	Chap. 17-Gusset Plate Connections, Seismic Issues ,
Apr 11	Fri.	Discussion	Discussion of gusset plates connections HW8 due
Apr 11	Fri.	31	Chap. 18- Column Base Plates and Column Splices, Seismic Issues
Apr 14	Mon.	32	Chap. 18- Column Base Plates for steel and composite structures
Apr 16	Wed.	33	Chap. 19-Design for Concentrated Forces
Apr 18	Fri.	Discussion	Midterm II Exam (Covers Chapters 8 -15 inclusive), Open book (8:20-9:50)
Apr. 18	Fri.	34	Midterm II Exam (Covers Chapters 8-15 inclusive), Open book (8:20-9:50)
Apr 21	Mon.	35	Chap. 20-Structural Systems for Building Structures
Apr 23	Wed.	36	Chap. 20.1-Steel Moment Frames , gravity and seismic design
Apr 25	Fri.	Discussion	Discussion of steel and composite systems and seismic design
Apr 25	Fri.	37	Chap. 20.2-Composite Moment Frames , gravity and seismic design
Apr 28	Mon.	38	Chap. 20.3-Steel Concentrically Braced frames, gravity and seismic design
Apr 30	Wed.	39	Chap. 20.4-Composite Concentrically Braced Frames, gravity and seismic design
May 2	Fri.	Discussion	Discussion of steel and composite systems and seismic design
May 2	Fri.	40	Chap. 20.5-Steel Eccentrically Braced Frames, gravity and seismic design
May 5	Mon.	41	Chap. 20.6-Steel Shear Walls, gravity and seismic design
May 7	Wed.	42	Chap. 20.7- Composite Shear Walls, gravity and seismic design
May 9	Fri.	Discussion	Discussion of steel and composite systems and seismic design
May 9	Fri.	43	Chap. 21.- Introduction to blast resistance of steel structures, System Design Assignment Due
May 12	Mon	44	Course closure and Course Evaluation

Revised,
Jan 29 08

There is no Final Exam in this course

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