

- A. GENERAL** 1. Course: Architecture 213b, 3 units, Harris101, Tu/Th, 12:30
2. Title: Structure Systems and Seismic Design
3. Class meetings: Two 1.5 hour lectures and one 1 hour lab per week
4. Examinations: Quizzes, Midterm and Final Exam
5. **Student hours: 9 hours per week, including class and lab time**

B. OBJECTIVES

Develop understanding of building structures and selection criteria for appropriate systems; integration of structures with architectural objectives; conceptual design of structures for gravity and lateral wind and seismic loads. *Ability* to demonstrate the basic principles of structural systems and their ability to withstand gravitational and lateral wind and seismic forces, as well as the selection and application of the appropriate structural system.

C. SUBJECT MATTER

Structural systems to resist gravity and lateral loads. Integration architectural and structural objectives for synergy of form and structure. Selection of systems for diverse objectives. Potential of structures to define space, serve as ordering system, provide texture and tectonics. *The USC School of Architecture's five year BARCH degree and the two year M.ARCH degree are accredited professional architectural degree programs. All students can access and review the NAAB Conditions of Accreditation (including the Student Performance Criteria) on the NAAB Website: <http://www.naab.org/accreditation/home>*

D. ASSIGNMENTS

Readings, homework, quizzes, term projects, Mid Term and Final Exam.

E. BASIS FOR COURSE GRADE

Subject	percentage of grade	Grading scale:
Term projects	~23%	A = 90 - 100%
Homework, exercise, etc.	~31%	B = 80 - 90%
Mid Term	~23%	C = 70 - 80%
Final Exam	~23%	D = 60 - 70%
Total	100%	

To pass the course students must pass the Final and miss not more than two classes

F. Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>. Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu/> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* provides 24/7 confidential support, and the sexual assault resource center describes reporting options and other resources. Diversity and Inclusion is covered at: <https://diversity.usc.edu/>

G. Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* (306 Watt Way, 213-740-0776) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu/> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

F. REQUIRED TEXT Schierle (2008) [*Structure and Design*](#)

H. Resource books

ASCE 7, Design Loads for Buildings and Other Structures, <http://www.asce.org/asce-7/>
IBC *International Building Code*, <https://www.bnibooks.com/product/2018-icc-ibc-ll>
AISC *Manual of Steel Construction*, American Institute of Steel Construction, <https://www.aisc.org/>
Ambrose / Vergun (1987) *Design for Lateral Forces*, Wiley
Arnold / Reitherman (1982) *Building Configuration and Seismic Design*, Wiley
Natterer et al (2005) *Timber Design and Construction Handbook*, McGraw Hill
Schierle (1968) *Lightweight Tension Structures*, UCB,
Schierle (1970) *Prestressed Trusses* (USC ARCH library)
Schueller (1983) *Horizontal Span Structures*, Wiley

I. COURSE OUTLINE

JANUARY

Tu 08 Introduction: synergy of form and structure	Term Project issued
Th 10 Selection of structure systems	Read chapter 10
Tu 15 Seismic design, tsunami	Read chapter 9
Th 17 Design for wind, wind storms	Read chapter 9
Tu 22 Horizontal structures introduction	Read chapter 11
Th 24 Design of tensile structures	Read chapter 14
Tu 29 Design of suspended structures	Read pages 318-323
Th 31 Design of arch and vault structures	Read pages 272-284

FEBRUARY

Tu 5 Fabric structure design	Read pages 330-352
Th 7 Joist beam and frame structure design	Read chapter 11
Tu 12 Truss structure design	Read chapter 12
Th 14 Cable truss design	Read pages 324-329
Tu 19 Stayed structure design	Read pages 310-317
Th 21 Vierendeel structure design	Read pages 229-234
Tu 26 Shell structure design	Read pages 235-243 & 285-307
Th 28 Folded plates and cylindrical shell design	Read pages 235-243

MARCH

Tu 5 Wood structures	Read chapter 20
Th 7 Term project review, 12:30 – 4:20 pm	Read pages 209-214
11-16 SPRING BREAK	
Tu 19 Foundation design	Read pages 534-536
Th 21 Midterm review	
Tu 26 SDG: Structure Design Graph	Review SDG tutorial
Th 28 Midterm Exam	

APRIL

Th 2 Introduction of vertical/lateral structures	Read chapter 15
Tu 4 Portal Method	Read pages 201-202
Tu 09 Moment frame design	Read chapter 11 & pages 203-204
Th 11 Braced frame & framed tube design	Read pages 205-206
Tu 16 Shear wall design	Read chapter 16
Th 18 Final review	

May

We 08 Final Exam, 2 to 4 pm, Harris 101