

ARCH 431. Integrated Structures

Instructor: Prof. Anne B. Nichols
A413 Langford
(979) 845-6540 anichols@tamu.edu

Office Hours: 9-10 am and 2-3 pm MW
11-12 pm TR
(and by appointment M-R)

Catalogue Description: Selection and economics of structural systems in the context of integrating structural systems into a building through good design; analysis and design of wood, steel, concrete, and composite systems and members in relation to building design. Admission to upper level in environmental design; ARCH 305, ARCH 331, ARCH 335; concurrent enrollment in ARCH 405 and ARCH 435.

Goals: This class is designed to provide students with an understanding of how to integrate structural systems into a building through good design. Students who satisfactorily complete this class will be expected to know how to integrate structural systems into their architecture projects. Therefore, it will be taught at the appropriate level to accomplish this task.

Objectives:

- To be aware of appropriate structural elements and their relation to architectural form.
- To develop an understanding of fundamental structural theory and behavior of typical structural elements.
- To perform analysis and design of structural members in wood, steel, and concrete in their relation to good building design.

Text: The Architect's Studio Companion: Rules of Thumb for Preliminary Design, Allen & Iano, (2006) Wiley, ISBN 978-0471736226
Statics and Strength of Materials –Foundations for Structural Design, Onouye, (2005) Pearson - Prentice Hall, ISBN 0-13-111837-4
ARCH 331 Note Set, Nichols

Reference: ACI 318 Code and Commentary (most current edition)
AISC Steel Construction Manual (most current edition of combined ASD & LRFD)
National Design Specifications for Wood

Timetable: CREDIT 2.0 (1:2) 11:20 am - 1:00 pm Lecture/Lab F
(section 504) 1:30 – 2:20 pm

Grading: Throughout this course you will be required to solve problems and answer questions that are based on the material presented in order to achieve our goal of integrating structural systems into a building through good design. Specifically, your letter grade for the course will be determined based on homework assignments, midterm, final project, and a professional evaluation.

| | |
|--|-----|
| Assignments | 30% |
| Mid-term Project (same due date as studio) | 20% |
| Final Project (same due date as studio) | 40% |
| Professional Evaluation | 10% |

(Attendance, Participation)

Must be in attendance to participate and be evaluated

| | |
|-----------------|---------------|
| Letter Grades : | 90-100..... A |
| | 80-89..... B |
| | 70-79..... C |
| | 60-69..... D |
| | 0-59..... F |

Performance Evaluation

A (90-100) Superior

- ♦ The weekly deliverables have been completed and submitted on-time and are clearly identified with the student's name, course number, and semester.
- ♦ Exceptional performance strongly exceeding requirements
- ♦ Exceptional evidence of learning and growth with strong initiative with independent resourcefulness
- ♦ Exemplary work habits and contributions with a strong positive attitude toward your work

B (80-89) Above Average

- ♦ The weekly deliverables have been completed and submitted on-time and are clearly identified with the student's name, course number, and semester.
- ♦ Adequate performance above the norm for the products that meet and go beyond the assigned objectives
- ♦ Good initiative with clear evidence of learning and growth
- ♦ Good and consistent work habits with and positive improvements showing marks of progress
- ♦ Positive contributions to the class

C (70-79) Average

- ♦ The weekly deliverables have been completed and submitted on-time and are clearly identified with the student's name, course number, and semester.
- ♦ Work products satisfy requirements but with an indifferent and unnoticeable level of initiative, attitude and improvement
- ♦ Moderate or conservative development of skills and knowledge base
- ♦ Inconsistent attention to work and class participation

D (60-69) Below Average

- ♦ The weekly deliverables have been completed and submitted on-time and are clearly identified with the student's name, course number, and semester.
- ♦ Inadequate performance with work products not satisfying the assigned objectives
- ♦ Limited understanding of concepts and weak skill development
- ♦ Poor attention to work and class participation

F (<60)

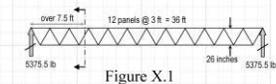
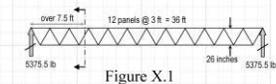
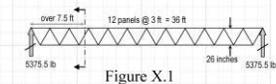
- ♦ Ineffective performance with inadequate or missing work products
- ♦ Failure to demonstrate understanding of basic concepts and skills
- ♦ Little indication of interest in the class or architectural education

Policy: 1) Attendance: Necessary. Required.* And subject to University Policy. See Part I Section 7 in Texas A&M University Student Rules: <http://student-rules.tamu.edu/> Absences related to illness or injury must be documented according to <http://shs.tamu.edu/attendance.htm> *including* the Explanatory Statement for Absence from class for 3 days or less. Doctor visits not related to immediate illness or injury are not excused absences. Attendance will be taken periodically and assignments will not be accepted from anyone other than the executor. Excessive absences will result in a lowering of the final grade. *Use of electronic devices not directly related to projects or assignments during lecture/lab is prohibited.*

2) Assignments: Due as stated on the assignment statements. *No late assignments* without a University excuse will be accepted. Analytical assignments must conform to the formal solution report formatting (see #3). In addition, it is possible that only one or two random problems of an analytical assignment will be collected for grading, or all problems will be collected. Therefore, it is important that each problem be solved in its entirety on a separate sheet(s) of engineering paper. All work and values used in calculations must be shown for proper credit.

- 3) **Reports:** Formal solution reports for analytical assignments must be provided on 8-½ in. x 11 in. engineering paper available in the bookstore. Work submitted on any other paper type will not be accepted. Work should be presented on the front side of the paper *only* (grid lines are on the back). Your name, course, section number, assignment number, and due date must appear at the top of each page. The current page number and total number of pages must appear in the upper right hand corner of each page.

Mandatory Sections

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|---|---|--------------|--------------|--------------|---|-----------|---|--|--|------------|--------|-----------|-----------|---|---|--|--|
| <p>Problem: Give a problem statement in complete sentences.</p> <p>Given: State all that is known about the problems.</p> <p>Required: State what you have been asked to determine.</p> <p>Figures: Draw figures using a straight edge, show appropriate units, number each figure, and refer subsequently to a figure by its number.</p> <p>Solution: Present your solution in a logical and methodical manner.</p> <p>Summary: Provide an organized summary of the problem by listing each item from the required statement followed by its corresponding result from the solution section.</p> | <p><i>Format:</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Assignment #</td> <td style="width: 45%;">ARCH 431-50X</td> <td style="width: 20%;">Anne Nichols</td> <td style="width: 20%; text-align: right;">¼</td> </tr> <tr> <td>9/14/20XX</td> <td colspan="3" rowspan="5" style="text-align: center; vertical-align: middle;">  </td> </tr> <tr> <td>Problem X)</td> </tr> <tr> <td>Given:</td> </tr> <tr> <td>Required:</td> </tr> <tr> <td>Solution:</td> </tr> <tr> <td>⋮</td> <td colspan="3" style="border: 1px solid black; padding: 5px;"> maximum tensile force = 16.7 k maximum compressive force = 14.6 k maximum web force = 3.8 k (C) </td> </tr> </table> | Assignment # | ARCH 431-50X | Anne Nichols | ¼ | 9/14/20XX |  | | | Problem X) | Given: | Required: | Solution: | ⋮ | maximum tensile force = 16.7 k maximum compressive force = 14.6 k maximum web force = 3.8 k (C) | | |
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| 9/14/20XX |  | | | | | | | | | | | | | | | | |
| Problem X) | | | | | | | | | | | | | | | | | |
| Given: | | | | | | | | | | | | | | | | | |
| Required: | | | | | | | | | | | | | | | | | |
| Solution: | | | | | | | | | | | | | | | | | |
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- 4) **Site Visits:** Proper footwear is required when at construction or site visits. The shoes must be closed-toe and have hard soles. This means no flip-flops or tennis shoes.

5) **Studio Culture at Texas A&M University: A Policy Statement**

Studio Culture Statement

All students, faculty, administration and staff of the Department of Architecture at Texas A&M University are dedicated to the principle that the Design Studio is the central component of an effective education in architecture. They are equally dedicated to the belief that students and faculty must lead balanced lives and use time wisely, including time outside the design studio, to gain from all aspects of a university education and world experiences. They also believe that design is the integration of many parts, that process is as important as product, and that the act of design and of professional practice is inherently interdisciplinary, requiring active and respectful collaboration with others.

- 6) **Aggie Honor Code:** “An Aggie does not lie, cheat, or steal or tolerate those who do.”

The University policy will be strictly enforced. See Part I Section 20 in Texas A&M University Student Rules: <http://student-rules.tamu.edu/> Plagiarism (deliberate misrepresentation of someone else’s work as your own) will be treated strictly according to University policy as outlined by the Office of the Aggie Honor System: <http://www.tamu.edu/aggiehonor/>

- 7) **The American with Disabilities Act (ADA)** is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring accommodation, please contact the Department for Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637. Also contact Prof. Nichols at the beginning of the semester.

- 8) **Grievances:** For grievances other than those listed in Part III in Texas A&M University Student Rules: <http://student-rules.tamu.edu/> the *instructor* must be the first point of contact.

Tentative Schedule (*subject to change at any time throughout the semester*)

| Lecture/Lab | Topic |
|--------------------|--|
| 1. | Introduction, System Assemblies and Load Tracing |
| 2. | Design Loads and Structural Performance Requirements |
| 3. | Structural Systems Selection |
| 4. | Methodology and Building Codes |
| 5. | Reading Drawings |
| 6. | Foundation Selection and Design |
| 7. | Design for Lateral Loads |
| 8. | Wood Construction |
| 9. | Steel Construction |
| 10. | Concrete Construction |
| 11. | Masonry Construction |
| 12. | Composite Construction |
| 13. | Connections |
| 14. | Structural drawings |