

Florida Atlantic University

College for Design and Social Inquiry

School of Architecture

**ARC-2580 ARCHITECTURAL STRUCTURES 1**

**CRN 38023**

3 Credits

SRING 2018

**Class Location:** GS-115 (Monday and Wednesday 7:10 pm to 8:30 pm)

**Instructor:** Associate Professor Jean Martin Caldieron, Ph.D.

**Office:** HEC-812 **Time:** (Monday and Wednesday from 6:30 to 7:00 pm and by appointment before Structures 1 classes in Boca

**Phone:** 1-954-762-5643  **Email**: [jcaldie1@fau.edu](mailto:jcaldie1@fau.edu)

**Course Description:**

This course is an introduction to structural design and statics. Course work examines design issues relating to various structural systems and materials. Student work is assessed through written exercises, case studies, exams, and structural design models.

**Course Objectives/learning outcomes**

Primary objectives of the course are:

• To gain an understanding of structural materials and their characteristics, behaviors, and limitations.

• To gain an understanding of terminology related to structural design.

• To refine skills of graphic presentation, descriptive communication, and analysis pertaining to structural design.

• To refine skills of research and analysis of structural systems and their integration in a design process.

Primary objective will be evaluated in the last presentation of all projects with a percentage of 25% of the grade in each one. This course serves as a continuation of the course of structures 1. The main components are the study of structural analysis and design in wood, masonry and steel with reference to integration of technical systems and architectural design decisions. Through studio consultation, the learned theories are applied to studio projects.

The main topics are:

Understanding of statics, precedents studies of important buildings, calculation of beams (diagrams of shear and moments, trusses, structural joints etc. Preparing students for future calculation of steel, Concrete, Wood and Masonry in future courses. The course progresses through exercises and problems complemented by structural design projects that inquire students to solve structural problems by building models and testing them. Furthermore, a series of lectures, working examples, video presentations, and case studies will provide insight into the three specific structural materials of this course.

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| **Pre-requisites**  **Co-Requisites** | MAC 2233 and PHY 2053  ARC 2304 (Architectural Design 4) |

Dropbox: The information of this class is located in dropbox.com User: [faustructures@yahoo.com](mailto:faustructures@yahoo.com)

Password: structures

**Required Text and Readings**:

Students are required to use the following textbook, an electronic version will be posted in our dropbox:

Simplified Mechanics and Strength of Materials, James Ambrose 6th. Edition, Wiley and sons, ISBN: 0471-40052-1.

Students are also encouraged to also look at the following additional texts:

• Building Structures Illustrated by Ching – Onouye and Zuberbuhler

• Shaping Structures Statistics by Waclaw Zalewski and Edward Allen

Additional references: Text book of structures 1 - Simplified Mechanics and Strength of Materials, James Ambrose 6th. Edition, Wiley and sons, ISBN: 0471-40052-1

**Supplemental Readings:**

- Manual of Steel Construction – Allowable Stress Design, 9th Edition American Institute of Steel Construction (AISC), 1991

- American Forest & Paper Association, National Design Specifications for Wood Construction (NDS), American Forest & Paper Association, AFPA, Washington DC

**Course Evaluation Method**:

- Project 1: Egg Project 5% (Due 17 Jan) (Final Project Due )

- Project 2: Bridge Project 10% (Due 12 Feb) (Final Project Due )

- Project 3: Detail Project 10% (Due 12 March) (Final Project Due )

- Project 4: Detail Project 10% ( Due 18 April ) (Final Project Due )

- Test 1 15% (Feb. 5)

- Test 2 15% (Feb 12)

- Test 3 15% (April 2)

- Final Test 20% (April 25th ) Attention the test will NOT be April 30th.

**Grading Scale:**

The final grade represents the culmination of all work completed during the term. The grade depends directly upon demonstration of the minimum standard of learning expected from this course. Grade determination will include, but is not limited to, the following criteria: class participation, craftsmanship, graphic proficiency, design quality, concept/design development, and overall attitude.

The final grade is a result of a curve distribution of the class performance, which is tentatively weighted as per the

GRADING SCALE in %

100- 93 A

92 – 90 A-

89 – 88 B+

87 – 83 B

82 – 80 B-

79 – 78 C+

77 – 73 C

72 – 70 C-

69 – 68 D+

67 – 63 D

62 – 60 D-

59 – 0 F

**Student Performance Criteria:**

Upon completion of this course, a minimum passing grade of C or better will require that the student:

• Be able to identify and use important precedents in structural design.

• Be able to research, analyze, evaluate, and implement appropriate structural designs.

• Be able to research, analyze, and evaluate the relevant work of important architects.

• Be able to research, analyze, and evaluate structural systems and their integration in the design process.

• Be able to analyze structural systems and integrate them in the design process.

Demonstrates the following National Architectural Accreditation Board (NAAB) SPC’s:

[01] Verbal Skills, [02] Graphic Skills, [03] Research Skills, [04] Critical Thinking Skills, [05] Fundamental Design Skills, [06] Collaborative Skills, [09] Use of Precedents, [14] Accessibility, [15] Site Conditions, [16] Formal Ordering Systems, [17] **Structural Systems, [**20] Building Envelope Systems, [25] Building Materials & Assemblies

**Policy on Make Ups/Late/Incompletes**

**Attendance is mandatory for each class.** Should it be necessary to miss a class, please write an e-mail in advance to alert me of your absence. Students are expected to attend class fully participate in the class activities and perform all assignments. Students absent from more than two classes without serious reasons (medical or otherwise) given in writing in advance of the class will drop a whole letter grade. Students absent from more than three classes must withdraw the class or take an F. Students absent of a required presentation, assignment, or examination will receive, without exception, an F for that presentation, assignment, or examination. Students appearing more than 15 minutes late for a review or presentation will be considered late. Two late arrivals will count as one absence. Students are expected to arrive promptly on time prior to the beginning of class with all required materials. Students are expected to report to class fully prepared. Any student attending class without the necessary working materials will be counted absent for that class. Students are expected to submit assignments and projects by scheduled submission times. Late work or make –ups will not be accepted. It could be allowed only in cases where a student is absent with documented, justifiable cause (i.e., medical, legal, intercollegiate activities.) Authorization for missing an exam should be arranged **prior** to the scheduled exam date for the class. Test, and projects will not be repeat under any circumstance.

**Special Requirements:**

Exams or test must be answered with pencil, markers or ball pens are not accepted Please bring a calculator, it is forbidden to lend calculators or any other material during the tests. Students using cell phone or cheating during the test will receive an F

**Classroom Etiquette Policy**

Cellular phones and pagers have to be silenced before the class begins. No attention shall be given these devices. No student may engage in text messaging. Doing so will result in the owner being asked to leave the class for the remainder of the period, and marked as absent for that day. Students will demonstrate respect for instructors and fellow students. Behavior that is disruptive to a positive learning environment will result in a warning on the first instance, and perhaps expulsion from the course in the second instance. Students are expected to bring all pertinent research notes and course materials to each class. Students are responsible for assigned readings and expected to participate in related discussions. Should an emergency exist and acceptable alternative can be agreed upon on a case-by-case basis in advance.

**Student Work:**

The School of Architecture reserves the right to retain any and all student work for the purpose of record, exhibition, and instruction. All students are encouraged to reproduce all work for their own records prior to submission of originals to the instructor. In the event of publication, the author or the work will be recognized and received full attribution.

**Disability Statement:**

*In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodation due to a disability to properly execute coursework must register with Student Accessibility Services (SAS)—in Boca Raton, SU 133 (561-297-3880); in Davie, LA 131 (954-236-1222); or in Jupiter, SR 110 (561-799-8585)—and follow all SAS procedures. For more information:* [*http://www.fau.edu/sas/*](http://www.fau.edu/sas/)

**Code of Academic Integrity Policy**

*Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see the Code of Academic Integrity in the University Regulations at*

[*http://www.fau.edu/regulations/chapter4/4.001\_Code\_of\_Academic\_Integrity.pdf*](http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf)*.*

**Class Material** : The material is located in a dropbox: Username: [**faustructures@yahoo.com**](mailto:faustructures@yahoo.com) Passwords: **structures**

Please DO NOT print any material from the drop-box files using any of the school printers. We need to save paper!

IT IS FORBIDDEN TO USE THE SCHOOL COMPUTERS TO PRINT ANY OF THIS MATERIAL!!!!!

Please do not mess with the dropbox. Do not use for personal projects, for exchange information with your peers and to download anything except the assignments.

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|  | **Class N.** | **Date** |  | **Suggested Exercises** | **Class Discussion** | **Reading** |  |
|  | 1 | 8-Jan. | (Mon) |  | Introduction |  |  |
|  | 2 | 10 Jan. | (Wed) | | Forces and Vectors | (Ch. 1) (Ch.2) Handout 1 |  |
|  | 3 | 15 Jan. | (Mon) | **Martin Luther King Day - No Classes** | |  |  |
|  | 4 | 17 Jan. | (Wed) | **Egg project 1 Final** | Forces and force actions | (Ch.2) Handout 2 |  |
|  | 5 | 22 Jan. | (Mon) |  | No Classes Field Trip Design |  |  |
|  | 6 | 24 Jan. | (Wed) | Page 151 4.5 A to D | Beam basics - Reactions | Ch. 4 & Handout 3 |  |
|  | 7 | 29 Jan. | (Mon) | All chapter 4 | Reaction and Shear | Ch. 4 & Handout 4 |  |
|  | 8 | 31 Jan. | (Wed) | | Reactions and shear | Ch. 4 & Handout 5 |  |
|  | 9 | 5 Feb. | (Mon) | **Test Number 1- Chapters 1 -2 and Chap. 4 until page 151** | | |  |
|  | 10 | 7 Feb. | (Wed) | | Shear and moment | Ch. 4 |  |
|  | 11 | 12 Feb. | (Mon) | **Bridge project 2** | Beams | Ch. 5 |  |
|  | 12 | 14-Feb | (Wed) | TBA |  |  |  |
|  | 13 | 19 Feb. | (Mon) | Page 147 4.4 A to F | Trusses | Ch. 3 |  |
|  | 14 | 21 Feb. | (Wed) | | Review and trusses |  |  |
|  | 15 | 26-Feb | (Mon) | **Test Number 2- (Cha.1 to 6)** | |  |  |
|  | 16 | 28-Feb | (Wed) | | Group Work for Project 3 |  |  |
|  | 17 | 5-Mar | (Mon) | Spring Break - No Classes | | | |
|  | 18 | 7-Mar | (Wed) |
|  | 19 | 12-Mar | (Mon) | **Design project 3 Final** |  |  |  |
|  | 20 | 14-Mar | (Wed) | P. 18.a **to** 18.d & 11.a **to** 11.d | Stresses | Chapters 12-1 to 12.10 |  |
|  | 21 | 19-Mar | (Mon) | Problems 12.5 a,b,c. | Bending Stresses | Ch. 12.6 and 12.7 |  |
|  | 22 | 21-Mar | (Wed) | P. 12.6 a,b,c,d,e:12.7 a,b,c,d,e,f | Shear Stresses | Ch. 12.8 and 12.10 |  |
|  | 23 | 26-Mar | (Mon) | Problems 12.8 a,b,c & 12.9 a,b | Deflection | Deflection Ch. 13 |  |
|  | 24 | 28-Mar | (Wed) | Problems 13.6 a,b,c,d | Columns | Chapter 14.1 and 14.2 |  |
|  | 25 | 2-Apr | (Mon) | **Test Number 3- (Material included TBA)** | |  |  |
|  | 26 | 4-Apr | (Wed) | Problems 14.2 1,b,c,d,e,f,g,h | Columns | Ch. 14.3 |  |
|  | 27 | 9-Apr | (Mon) | Problems 14.3 a, b | Bolts | Ch. 16.1 - 16.5 |  |
|  | 28 | 11-Apr | (Wed) | Problems 16.5 a,b | Bolts and welds | Ch. 16.6 and 16.8 |  |
|  | 29 | 16-Apr | (Mon) | Problems 16.8 a,b | Bolts and welds |  |  |
|  | 30 | 18-Apr | (Wed) | **PROJECT 4 FINAL** |  |  |  |
|  | 31 | 23-Apr | (Mon) | **Final Review** |  |  |  |
|  | 32 | 25 Apr. | (Wed) | **FINAL TEST (All Chapters included)** | | |  |
|  | 33 | 30 Apr. | (Mon) | **FINAL GRADE POSTED** | | |  |
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