**School of Architecture | Georgia Tech | Fall 20xx**

ARCH 4015: Structures I (3 credits)

Credit Hours: 3 credits (3 contact hours)

Days and hours of class: Tuesday and Thursday, 9:30 to 10:45 a.m.

Prerequisite: ARCH 4015

Instructor: Name

Office location/Email address

Office Hours

**Course Description** (from the Catalog) Go to <http://www.catalog.gatech.edu/colleges/coa/architecture/#coursestext> to find the course description for the class.

Gravity loads on building structures. Introduction to structural planning. Design of wood and steel structures. Properties of wood and architectural metals. Computer-based analysis of structures.

This course provides students with a basic knowledge of analysis and design of building structures and the ordering of structural systems to resist gravity and lateral loads. Students will investigate the behavior of structures through design examples, case studies, and physical testing of models. Students will gain an understanding of structural design in collaboration with their structural engineering partners.

**NAAB Criteria**

This course and its follow-on course are requirements for the professional degree in architecture and as such focus on the core knowledge of building structures as contained in the Architectural Registration Exam (ARE) and as set forth by the National Architectural Accrediting Board (NAAB) in the 2014 Conditions of Accreditation[[1]](#footnote-1). NAAB describes the technical competency expected of architects as related to building structures and materials as follows:

A.5 *Ordering Systems*: **Ability** to apply the fundamentals of both natural and

formal ordering systems and the capacity of each to inform two- and three dimensional

design.

Realm B: *Building Practices, Technical Skills, and Knowledge*. Graduates from NAAB accredited programs must be able to comprehend the technical aspects of design, systems, and materials and be able to apply that comprehension to architectural solutions. In addition, the impact of such decisions on the environment must be well considered.

B.5 *Structural Systems*: **Ability** to demonstrate the basic principles of structural systems and their ability to withstand gravitational, seismic, and lateral forces, as well as the selection and application of the appropriate structural system.

B.8 *Building Materials and Assemblies*: **Understanding** of the basic principles used in the appropriate selection of interior and exterior construction materials, finishes, products, components, and assemblies based on their inherent performance, including environmental impact and reuse.

**Learning Objectives**

Upon successful completion of this course, students will be able to:

* To calculate the mathematics and physics that govern the structural analysis and design process: external and internal equilibrium, stability, free body diagrams, internal force diagrams.
* To apply the concept of stress and strain – the mapping functions between material properties and structural requirements for load and deformation capacity.
* To describe and demonstrate the structural design process through a group collaboration project: geometric synthesis → structural idealization → load identification → structural analysis → structural design → construction;
* To evaluate and create typical structural framing schema in wood structures;
* To design wood members, both common and engineered, using allowable stress design for tension, compression, flexural, and lateral load resisting elements.

In addition to its technical role, the course content complements architectural studio by focusing on the form-giving and construction-technology aspects of building structures.

**Textbook and References**

The course does not have a required text. The following reference texts are recommended – we will assign readings in some of these during the semester.

**Reference texts:**

Statics and Strength of Materials for Architecture and Building Construction, 4th Edition (2011),   
by Onouye and Kane

Form and Forces: Designing Efficient, Expressive Structures, 1st Edition (2009), by Allen and Zalewski

National Design Specification for Wood Construction (w/ Design Supplement), American Forest and Paper Association.

Minimum Design Loads for Buildings and Other Structures, ASCE 7-10, American Society of Civil Engineers, 2005.

Wood Construction Connectors, Simpson Strong-Tie Company.

**Homework**

Homework will be graded and solutions will be posted on Canvas. Each homework will be assigned a due date. Homework may be completed with one partner (two people total per assignment) and must be turned in on time to receive full credit. Late homework submissions will not be received. The lowest two homework grades will be dropped. You and your partner’s names are required to be on each submission. Homework must be neat and well laid out with an easy to follow logic. Use a straight edge, underline intermediate answers, and box your final answers. Homework grades will be based on accuracy, neatness, presentation and completeness of work, and inclusion of required information. Most homework assignments will be submitted in hand-written, hard-copy format, but a few may be submitted as a single PDF, uploaded to Canvas.

**Group Collaboration Project**

The group collaboration project will be completed in groups of three to five students. The project will involve the inception, design, analysis, and load testing of a structure. Last year’s project consisted of a balsa wood bridge. Groups will present their concepts to a panel during a mid-review and summarize their process and results in a project paper. More information to come.

**Grading**

The two quizzes will be announced at least one week in advance and are preliminarily scheduled in the course outline below. Grades on the quizzes will not be curved. I reserve the right to shift grades if I deem that the test was too difficult or long to complete in the allotted time. Course credit is distributed as follows:

Course credit is distributed as follows:

Homework (lowest dropped) 25%

Attendance and Participation 10%

Group Project 15%

Hourly Quizzes (2) 30%

Final Exam 20%

**TOTAL 100%**

|  |  |
| --- | --- |
| Grades Are Earned as Follows: | Percentage |
| A | 90-100% |
| B | 80-89% |
| C | 70-79% |
| D | 60-69% |
| F | < 60% |

# COURSE POLICIES

**Attendance**

If you are to do well in this class, you must attend. Much of the information needed to complete the course will come from my lectures and handouts. Absence from class is not considered a valid excuse for not turning in your homework. If you have an emergency or extenuating circumstance that prohibits your participation, you must let me know beforehand. Students who are chronically absent or are repeatedly late to class will lose the participation component of their final grade.

Link to GT Attendance Policy - <http://catalog.gatech.edu/rules/4/>

**Grading**

Evaluation of a student’s performance in each course is the responsibility of the instructor for that course. If the grade is disputed, a student may appeal to the instructor for a review. If, after the review, the student still believes that a grade has been assigned unfairly, the student may submit a written request for a grade appeal to the School Chair. The petition must clearly state the reasons for the appeal. A committee of faculty and students will convene to review the work and make a decision as to whether the grade will stand or be changed. Petitions must be settled and a final grade submitted to the registrar no later than three weeks after the end of the term in which the course was completed. The School Chair will inform the student of the committee’s decision regarding the grade appeal, and their decision is final.

A student may receive a grade of incomplete (I) by requesting permission from the instructor prior to the date of the final examination or presentation. Permission will be granted only under extraordinary circumstances and usually for medical reasons.

# Academic Integrity and Conduct

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. All Georgia Tech students should familiarize themselves with and abide by the Georgia Tech Honor Code: <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating on a quiz or exam or caught plagiarizing will be reported to the Office of Student Integrity.

For expectations of student and instructor conduct more generally, consult section 19 of the catalog listed above, entitled “Code of Conduct,” http://www.catalog.gatech.edu/rules/19/, and section 22, entitled “Student-Faculty Expectations,” at http://www.catalog.gatech.edu/rules/22/.

All persons in the classroom are expected to behave with courtesy towards others and in a way that does not interfere with the regular conduct of the class. Cell phones are to be turned off when students enter the classroom and should remain off for the duration of class; laptop computers are to be used only for taking notes; and students should not engage in private conversations while the instructor or other students are speaking. Anyone who does not adhere to these basic courtesies will be asked to leave.

# Accommodations for Students with Disabilities

Any student with a disability, that may require accommodation, should contact Office of Disability Services at 404-894-2563 or visit <http://disabilityservices.gatech.edu> to make an appointment to discuss his or her special needs and obtain an accommodations letter. He or she should also schedule an appointment to speak with the course instructor.

**Emergencies**

In case of emergency (e.g., fire, accident, or criminal act), please call the Georgia Tech Police at 404-894-2500. Please note that Perry Minyard, IT Support Administrator for the College of Architecture, is also a firefighter and an Emergency Medical Technician (EMT) certified in performing CPR.

**Ownership**

Physical copies of student work submitted to the school to satisfy course requirements—including, but not limited to digital files, papers, drawings, and models—become the property of the school. It is assumed as no obligation to safeguard such materials and may, at its discretion, retain them, return them to the student, or discard them.

# College of Design Facility Rules and Guidelines

Please consult the Georgia Tech Student Handbook regarding the use of facilities and all Institute policies. Aerosol sprays of any kind are strictly banned from the studio and surrounding areas. A new spray painting booth is now in operation in the COA shop, on the ground floor of the East Architecture Building.

Shop Use: All students using shop facilities must first have completed an orientation. Safety first, always! Noise should be kept to a minimum. Music may be listened to only through headphones, including evenings and weekends.

Studio Housekeeping: Students should feel free to organize their space creatively and expressively, but with respect to others around them. Try to prevent clutter from becoming a nuisance, distraction, or a hazard. The cleaning staff makes every effort to determine what is and is not trash, but their job can be made easier if you keep drawings filed and models off of the floor.

1. https://www.naab.org/wp-content/uploads/01\_Final-Approved-2014-NAAB-Conditions-for-Accreditation.pdf [↑](#footnote-ref-1)