THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

Department of Architecture

ARC 211 – Theory of Structures I

COURSE PARTICULARS

Course Code: ARC 211
Course Title: Theory of Structures 1
No. of Units: 2
Course Duration: Two hours of theory per week for 15 weeks.
Status: Compulsory
Course Email Address:
Course Webpage:
Prerequisite: NIL

COURSE INSTRUCTORS

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COURSE DESCRIPTION

The course is an empirical introduction to the understanding of structural action and potential of materials, with an emphasis on structure as an integral part of architectural design. It deals with basic definition of forces, stresses and strains, definition of structural elements and systems, resisting deformation, stability, historical development of structures and interdisciplinary design process. The course explores properties of materials - tensile, compressive, shear stresses and strains in simple structures. Stresses and deformations in beams, restrained and continuous beams are also considered.

COURSE OBJECTIVES

The objectives of this course are to:

- introduce students to the theory and application of structures in buildings;
- provide students with opportunities to develop simple and basic calculation skills with respect to building structures and design.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:
(Knowledge based)

- classify and explain the properties of materials and the different types of stresses;
- classify and explain the different types of strain;
- understand importance of structures in buildings;
- understand the relationship between stress and strain;
- understand the causes of stresses and deflection of beams.

(Skills)

- the student will also be able to:
    - calculate all types of stresses in steel and wooden beams and columns;
    - calculate strain in building materials;
    - calculate deflections in beams.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	5%
Assignments	15%
Test(s)	20%
Final Examination	60%
TOTAL	**100%**

GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures and also participate in all course-related exercises. Records of attendance will be kept and used to determine each student's qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must relate as soon as possible with any of the instructors, indicating the reason for the absence.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person's work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

Assignments and Group Work: Students are expected to submit assignments as scheduled. Failure to submit an assignment at the scheduled time will earn you zero for that assignment. Only under proven circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

Code of Conduct in Lecture Rooms and Laboratories: Students are expected to pay full attention to their works during lectures. There is no room for discussion, side-talks or any form of distraction. Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc*.) during lectures. Food and drinks are not permitted in the lecture rooms.

READING LIST

[1]Durka, M.F. (1989). *Structural Mechanics*. (4th Ed.). Morgan, W., Williams, D.T. Longman Group, UK. 266p.

[4]Introduction to Structural Mechanics *by Trefor J. Reynolds, Lewis E. Kent and David W. Lazenby.*

[4]Solving Problems in Structures. *Volumes 1 & 2. By P.C.L. Croxton and L.H. Martin.*

Legend

1- Available in the University Library, 2- Available in Departmental/School Libraries, 3- Available on the Internet.
4- Available as Personal Collection, 5- Available in local bookshops.

COURSE OUTLINE

Week	Topic	Remarks
1	Introduction and Course Overview Properties of materials	During this first class, the expectation of the students from the course will be documented.
2 & 3	Stress • Tensile Stress • Compressive Stress • Shear Stress	Exercise will involve calculations on all types of stresses. This essentially involves extensive class work.
4 & 5	Strain • Tensile Strain • Compressive Strain • Shear Strain • Torsion	The students will be made to grasp the practical application of strain in buildings.
6 - 8	Relationship between stress and strain (elasticity)	This involves serious calculations.
	Factor of safety	Safety is everybody's business. The students will be taught the safety factor of design beams.
		MID-SEMESTER TEST
10 - 12	Deflection of beams	Students will be taught the causes of deflection and its implications on the building and occupants. This study also involves calculations.
11 & 12	Site visitation	Students will be taken to a construction site on or outside the campus. They will also be required to write report and submit same for assessment.
14	REVISION	Owing to the enormity of the theories and calculations involved in this course, the revision of the course will start two weeks to the examination. This will give the students ample space to dwell more on the work in preparation for the semester exam.
15	REVISION	At this time, evaluation will be done to assess how far the students' expectations for the course have been met.