University of Jordan
School of Engineering
Civil Engineering Department

STRUCTURES III (0901541)
Syllabus
Spring 2016/2017

Instructors:
Dr. Rabab Allouzi (r.louzi@ju.edu.jo)

Office Hours: Monday and Wednesday 11:00AM-12:30PM

PREREQUISITES:
- Calculus (1) (ID:0301101)
- Statics (ID: 0901241)
- Strength of Materials (ID:0901242)
- Structures I (ID:0901341)
- Structures II (ID:0901342)

TEXT BOOKS:
- Matrix Analysis of Structures
  AslamKassimali
  CL Engineering
  2 edition (January 1, 2011)
- An introduction to Finite Element Method
  J. N. Reddy
  McGraw-Hill Education
  3rd edition, 2005
- The Plastic Methods of Structural Analysis
  Neal, B.G.
  John Wiley, New York
  1956
- SAP Manual
- Matlab Manual

REFERENCES:

- Mechanics of Structures Vol-II
  S. B. Junnarkar& H.J. Shah
  Charotar Publishing House
  (1 January 2012)
- Structural Analysis
  R.C. Hibbeler
  Prentice Hall
  9th edition (July 27, 2014)
- Fundamentals of Structural Mechanics
  Keith Hjelmstad
  Springer
  2nd edition, 1997
- Plastic Analysis of Structures
  P.G. Hodge
  McGraw-Hill, New York
  1959

GRADING SYSTEM:

Mid Exam (30%)
Project 1 (10%)
Project 2 (10%)
Final Exam (50%)

PROJECTS:

- Projects are assigned to students in groups to enhance team work. Each group will be asked to present their solution when the instructor notify them a week ahead of time.
- The solutions should be submitted in papers before the presentation. Any solution that does not look professional will not be reviewed and will receive automatically a zero.
- Do not crowd your solutions; start each solution on a separate page.
- Indicate your sign convention, and relevant parameters, labels, and coordinates on your illustrations.
- Your final answer should be identifiable; underline or draw a box around your final answer. No multiple answers.
- Provide full solutions. If it is not possible to follow your solution logic easily, you may get zero for your solution even if your "final" answer has the right value or expression.

POLICIES:

- MAKE UP exam policy: for students who cannot attend regular exams due to serious illness, or family emergency (all with written proof approved from the University of Jordan regulations), a makeup exam may be arranged AFTER the regular exam. The instructor must be notified prior to the exam, and no exceptions will be made.

- You are NOT ALLOWED to use CELL PHONE. Close your phone before you get to class unless you are expecting an emergency call then please let your instructor know before class.
- If you have a course-related question, please see the instructor during office hours or set an appointment by email.
- All cheating in the course will be referred to the Office of the Dean of Students
- You are expected to arrive in class and be seated on time and not leave the classroom before the instructor dismisses class. If you will not be arriving on time or have to leave early then let the instructor know beforehand.
- Individuals engaged in any activity that disturbs the attention of the class will be asked to leave the classroom immediately.

CONTENT:

week	Topics
1	Introduction to Structural Analysis: Elastic vs Plastic Introduction to various elastic structural analysis methods: Classical analysis, Matrix analysis, and Finite Element Analysis of structures
2-3	Matrix Stiffness Method: Trusses
4	Programming Language: MATLAB
5	Matrix Stiffness Method: Beams
6	Matrix Stiffness Method: Plane Frames
7-8	Finite-element-based structural program for the analysis and design of civil structures: SAP
9-10	Matrix Flexibility Method
11-13	Introduction to Finite Element Analysis Review of elasticity Variational and Energy Methods Finite Element Formulation
14-15	Plastic analysis of structures
16	Final exams week

LEARNING OUTCOMES
Upon successful completion of the course, the students should be able to:
- Understand the difference between elastic and plastic analysis and know when to use each one.
- Discretise simple structures, identify degrees of freedom and formulate stiffness matrix.
- Solve plane beams, trusses and frames for joint displacements and member forces.
- Understand the concept of structural stability and its significance in structural design.
- Be familiar with computer applications for structural analyses.
- Be familiar with computer applications to enhance student's capability to code matrix methods and 1-d finite element problem.
- Understands the basics of plastic analysis on beams.