CVLE 311 Structural Analysis I

Course Layout - Fall 2015-2016

Curricular Area	Civil Engineering – Structural Sequence	
Type of Course	Mandatory - Major	
Catalogue Description	Stability and determinacy of structures. Elastic deformation (slope and deflection) of beams by double-integration method; Moment-area theorems; and Conjugate Beam Method. Strain energy theorems – Slopes and deflection of beams, frames and trusses utilizing principle of virtual work. Introduction to indeterminate structures: Compatibility conditions and analysis of indeterminate structures by consistent deformation method.	
Prerequisites by Courses	CVLE 212 – Elementary Structural Analysis	
Prerequisites by Topics	Statics, mechanics of materials, and elementary structural analysis.	
Instructors	Dr. Hassan Ghanem (h.ghanem@bau.edu.lb) Block D Office --- (Phone Ext 4308)	
Course schedule/rooms	Section 1 Monday 12:00 – 14:00 pm (BT112) Wednesday 09:00 - 10:00 am (BT110)	Section 2 Monday 09:00 – 11:00 am (BT112) Wednesday 12:00 - 13:00 pm (BT112)
Office Hours	Monday: 11:00 - 12:00 Tuesday: 08:00 - 9:30 Wednesday: 10:00 - 12:00 Thursday: 08:00 - 09:30 and 13:00 – 14:00	
Load	3 credits; 2 Lecture-sessions/week	
Textbook	R.C. Hibbeler, *Structural Analysis*, Eight or later Edition, Prentice Hall, 2012	
Reference Books	1. J. Kennedy, and M. Madugula, "Elastic Analysis of Structures", Harper & Row. Ed. 1990. 2. J. McCormac, "Structural Analysis", Harper Internat. Edition, 4th Ed. 3. C. Norris, J. Wilbur, and S. Utku, "Elementary Structural Analysis", McGraw-Hill Intern. Editions, 4th Ed.	
Topics – **Week [1-2] 31/08/2015**	1. Review of basic concepts of structural analysis 2. Stability and determinacy of structures. 3. Elastic Deformation of Structures	
Topics – **Week [3-5] 14/09/2015**	• Review of beam theory; equilibrium, compatibility and constitutive equations • Geometric methods for computing displacements of statically determinate beams and frames: double integration, moment-area theorems, and the conjugate beam method	

	Week [6-8] **05/10/2015** **Exam I**	4. Trusses • Basic theory of simple plane trusses; equilibrium, compatibility, and constitutive equations • Energy methods for computing displacements of statically determinate trusses: method of real work and method of virtual work, Temperature and Fabrication errors. • Analysis of statically indeterminate trusses: the flexibility (force) method 5. Beams and frames • Review of beam theory; equilibrium, compatibility and constitutive equations • Energy methods for computing displacements of statically determinate beams and frames: method of real work and method of virtual work • Temperature and yielding of support effects • Beams on elastic supports – linear and torsional spring model - Applications • Analysis of statically indeterminate beams and frames: the flexibility (force) method 6. Analysis of Indeterminate Composite Structural Systems: method of real work and method of virtual work.
	Week [9-13] **26/10/2015** **Exam II**	
	Week [14-15] **30/11/2015**	

Learning Outcomes **Correlation with**	**Program Outcomes**	**Program Objectives**
Students will know the fundamental structural concepts of beam and truss theories and the basic principles of structural analysis.	a	1
Students will demonstrate the ability to determine the state of stability and degree of indeterminacy of structures.	a, b	2
Students will demonstrate the ability to apply the fundamental principles of structural analysis to analyze determinate trusses, beams, and frames by the principle of Virtual Work – Energy Approach.	a, b	2
Students will demonstrate the ability to apply the fundamental principles of structural analysis to analyze indeterminate trusses, beams, and frames by the flexibility and classical displacement methods	a, b	2
Students will demonstrate the ability to apply the fundamental principles of structural analysis to compute and sketch the elastic deformed shape of Trusses, Beams , Frames, as well as Composite Structures.	a, b	2
Students are familiar with available structural analysis computer programs and will demonstrate the ability to practice their use while working in teams.	e, g, h	2, 6

Learning Outcomes Assessment Tools	**Exams**	**HW s**	**Lab Reports**	**Project Report**	**Course Survey**
Students will know the fundamental structural concepts of beam and truss theories and the basic principles of structural analysis.	✓	✓			✓

Students will demonstrate the ability to determine the state of stability and degree of indeterminacy of structures.	✓	✓			✓
Students will demonstrate the ability to apply the fundamental principles of structural analysis to analyze determinate trusses, beams, and frames by the principle of Virtual Work – Energy Approach.	✓	✓			✓
Students will demonstrate the ability to apply the fundamental principles of structural analysis to analyze indeterminate trusses, beams, and frames by the flexibility and classical displacement methods	✓	✓			✓
Students will demonstrate the ability to apply the fundamental principles of structural analysis to compute and sketch the elastic deformed shape of Trusses, Beams, Frames, as well as Composite Structures.	✓	✓			✓
Students are familiar with available structural analysis computer programs and will demonstrate the ability to practice their use while working in teams.	✓	✓			✓

Assessment:

1. Attendance (as below).
2. homework assignments (5%)
3. Test 1 (25%)
4. Test 2 (30%)
5. Final exam. (40%)
6. **ZERO-TOLERANCE** policy on cheating and plagiarism.

Attendance: Attendance is **mandatory**. Class attendance will be taken and students will be penalized for absences according to the rules set by BAU regulations, and specified in the CE Student Manual; i.e. students who miss more than one-fifth of the sessions of any course in the first ten weeks of the semester will be required to withdraw from the course with a grade of "W".

1 Assessment Dates:

Test 1: October 12, 2015
Test 2: November 16, 2015
Final Exam: January 29, 2016

Course Coordinator	Dr. Zaher Abu Saleh
Date	September, 2014