



Course Specifications

Course Title:	Structural Mechanics I
Course Code:	CE 204
Program:	B.Sc. in Civil Engineering
Department:	Civil Engineering
College:	Jubail University College
Institution:	Jubail University College

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A. Course Identification

1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Level 3, Second Year
4. Pre-requisites for this course (if any):	CE 201 Statics
5. Co-requisites for this course (if any):	None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	✓	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
Contact Hours		
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

CE 204 Structural Mechanics I (3-0-3)

Prerequisite: CE 201

Concepts of stress, strain, and constitutive relations; stress and deformation of axially loaded members; thermal stresses; pressure vessels; energy concepts; torsion of circular and thin-walled sections; shear and bending moment diagrams in beams; elastic bending; shear stress in beams; compound stresses; stress transformation; deflection of beams and introduction to the concept of singularity functions.

2. Course Main Objective

The main purpose of this course is to enable the students to competently use fundamental theories and techniques of mechanics to compute deformations, stresses, and strains and understand the physical behavior of materials.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and understanding	
	N/A	
2	Skills :	
2.1	Evaluate the aspects of bending, torsion, deflection and stability	1
2.2	Find slope and deflection by solving flexure equation with integration method	1
2.3	Determine the principal stress and maximum shear stress for 2D element	1
2.4	Draw shear force and bending moment diagrams for beams	1
2.5	Evaluate normal, shear, bending stresses and combined stresses	1
3	Values:	
	N/A	

C. Course Content

No	List of Topics	Contact Hours
1	<u>Unit 1: Stress</u> 1.1 Introduction of deformable body 1.2 Average, normal and shear stress 1.3 Allowable stress design	3
2	<u>Unit 2: Strain</u> 2.1 Normal strain and shear strain 2.2 Cartesian strain components 2.3 Small strain Analysis	3
3	<u>Unit 3: Mechanical Properties of Materials</u> 3.1 Tension and compression test 3.2 Stress-strain-diagram 3.3 Stress strain behavior of ductile and brittle materials 3.4 Hooke's law 3.5 Strain energy 3.6 Poisson's ratio.	6
4	<u>Unit 4: Axial Load</u> 4.1 Saint-Venant's principle 4.2 Elastic deformation of axially loaded members 4.3 Principle of superposition, Statically indeterminate axially loaded member 4.4 Thermal stress 4.5 Stress concentrations	6
5	<u>Unit 5: Torsion</u> 5.1 Torsional deformation of a circular shaft 5.2 The torsion formula 5.3 Power transmission	3
6	<u>Unit 6: Bending</u> 6.1 Shear and moment diagrams 6.2 Bending deformation of a straight members 6.3 The Flexure formula	6
7	<u>Unit 7: Transverse Shear</u> 7.1 Shear in straight members 7.2 The shear formula, limitations on the use of the shear formula	3

8	Unit 8: Combined Loadings 8.1 Thin-walled pressure vessels 8.2 State of stress caused by combined loading	3
9	Unit 9: Stress Transformation 9.1 Plane stress transformation and its general equation 9.2 Principal stress and maximum in-plane shear stress 9.3 Mohr's circle-plane stress	6
10	Unit 10: Deflection of Beams and Shaft 10.1 The elastic curve 10.2 Slope and deflection by integration 10.3 Concept of discontinuity functions (Singularity functions)	6
Total		45

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
	N/A		
2.0	Skills		
2.1	Evaluate the aspects of bending, torsion, deflection and stability	Interactive learning Self-directed learning	Assignments, Written Exams (Quiz, Midterm, Final)
2.2	Find slope and deflection by solving flexure equation with integration method		
2.3	Determine the principal stress and maximum shear stress for 2D element		
2.4	Draw shear force and bending moment diagrams for beams		
2.5	Determine normal, shear, bending stresses and combined stresses		
3.0	Values		
	N/A		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4	10%
2	Assignment 1	6	10%
3	Mid-term LT	8	20%
4	Quiz 2	12	10%
5	Assignment 2	14	10%
6	Final Exam LT	17-19	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Office hours 4 hr/week; students can go in times of office hours for teacher to explain what could not be understood from the lesson.
- Students can communicate with a staff member outside the official working hours by email.

- Students are also encouraged to visit their academic advisors.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Hibbeler, R.C. (2014), <i>Mechanics of Materials</i> , , Singapore: Prentice Hall
Essential References Materials	Spiegel, L., & Limbrunner, G. F. (2009), <i>Applied Statics and Strength of Materials</i> , The University of California, USA: Pearson Prentice Hall Gere, J. M., Goodno, B. J., (2012), <i>Mechanics of Materials</i> , USA: Cengage Learning
Electronic Materials	Online calculators from http://civilengineer.webinfolist.com/cecalc.htm
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture rooms with a capacity of at least 25 students and fitted with multimedia projector and a computer.
Technology Resources (AV, data show, Smart Board, software, etc.)	None
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment as per QMS-Policy-006 Feedback Survey, QMS-QAP-116 Monitoring Students' Satisfaction	Students	Indirect: Analyzing the results of the following surveys Course Evaluation Survey(CES), Program Evaluation Survey (PES), Student Experience Survey (SES)
Quality of Exam papers and Verifying Standards of Student Achievement as per QMS-Policy-		Direct: Peer review of examination papers and review or double check a

Evaluation Areas/Issues	Evaluators	Evaluation Methods
004 Policy for Examinations and Marking, QMS-ACP-102 Procedure for Marking Examinations	Examination Committee	minimum of three or 10% of answer papers. Verifying the entries in the Activity Mark Sheet.
Achievement of learning outcomes as per QMS-Policy-001 Course Review, QMS-CDP-106, QMS-CDP-112 Curriculum Review	Faculty	Direct: Course Report (Section B-3)
Implementation of the action plans based on previous semester as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS-CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-1, G-2)
Monitoring Teaching and Learning as per QMS-Policy-005 Monitoring of Teaching and Learning	Chairperson/Program Director/Course Director	Indirect: Feedback by Chairperson/Program director/Course director. Program Delivery Record.
Effectiveness of planned Teaching Strategies QMS-Policy-001 Course Review	Faculty	Indirect: Course Report (Section B-4)
Course effectiveness and planning for improvement as per QMS-Policy-001 Course Review, QMS-CDP-106 Procedure for Course Review, QMS- CDP-112 Procedure for Curriculum Review	Faculty	Direct and Indirect: Course report (Section G-3)
Verifying Standards of Student Achievement and Quality of Exam papers as per QMS-ACP-119 External Assessment Review	Assessment External Reviewer	Direct: Report of assessment external reviewer. Review of sample of ten or 10% of student's assessments and coursework scripts.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Civil Engineering Department Council
Reference No.	REG MIN-CED-10
Date	27-04-2020

Appendix A Revision Details

Revision no.	DESCRIPTION	Reference MoMs			
		DC		CDC	
		Sem	#	Sem	#
1	Revision of Course Teaching Strategies and action verbs based on the comments of NCAAA reviewer	392	4	392	4
2	Course Specification Template 2018	402			