هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

CONTENTS

Course Specification

(Bachelor)

1.1 COURSE SPECIFICATION OF THE SPECIALIZED COURSES

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :**Engineering Drawing**
Course Code: **111-GE-3**
Program:**Bachelor in Mechanical Engineering**
Department:**Mechanical Engineering**
College:**College of Engineering**
Institution:**King Khalid University, Abha, Saudi Arabia**
Version::**V10**
LastRevision Date:**21 June 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
0 L + 6 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	
3. Level/year at which this course is offered: (3rd /2nd)					
4. Course General Description:					
One of the best ways to communicate one's ideas is through some form of picture or drawing. This is especially true for the engineer. An engineering drawing course focuses on usage of drawing instruments, lettering, construction of geometric shapes, etc. Students study the use of dimensioning, shapes, and angles or views of such drawings. Dimensions feature prominently, with a focus on interpretation, importance, and accurate reflection of dimensions in engineering drawing. Other areas of study in this course may include projected views and the development of surfaces. This course covers an overview of using drawing tools, and to learn drawing isometric, orthographic projections, and sectional views, standards and conventions in drawing and dimensioning, and detailed drawings.					
5. Pre-requirements for this course (if any)**:**					
NIL					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
➢ **Recognize the principles of engineering drawing.** ➢ **Acquire imagination skills for projections of engineering parts.** ➢ **Master the use of engineering drawing tools.**					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	90
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the principles of engineering drawing related to isometric, orthographic projection, and sectioning	**PLO1.1**	Lectures and training exercises	Class work - home work, and final exams.
1.2	Express imagination skills in the projections of engineering parts	**PLO1.1**	Lectures and training exercises	Class work - home work, and final exams.
2.0	**Skills**			
2.1	Practice the use of engineering drawing tools.	**PLO2.3**	Lectures and training exercises	Class work - home work, and final exams.
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Sheet Sizes, Scales, Lines and Lettering, Scales Lettering – Engineering drawing tools and their using	12
2.	Tangency operations	12

3.	Projections – Isometric views	18
4.	Projections –Multiple views	12
5.	Free hand sketch – Dimensions	12
6.	Missing views	12
7.	Sectional Orthographic Projections Surfaces intersections, relations between point, line and surface	12
	Total	90

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class Work	Throughout	20 %
2.	Home Work	Throughout	20 %
11.	Mid Exams I & II	Midway (8 & 13)	30%
12.	Final Exam		30%
13.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	- Frederick Giesecke, Shawna Lockhart, Marla Goodman, Cindy Johnson “Technical Drawing with Engineering Graphics”, 16th Edition, 2023, ISBN 978-0138065720 - Randy Shih (Author), Luke Jumper (Author), AutoCAD 2024 Tutorial First Level 2D Fundamentals, 2023, ISBN 978-1630575854. - David E. Goetsch, William S. Chalk, Raymond L. Rickman, John Nelson. Technical Drawing and Engineering Communication, 6th Edition, 2010. (ISBN: 1111321752, 9781111321758)
Supportive References	Colin Simmons Dennis Maguire, Manual of Engineering Drawing, 4th Edition. Technical Product Specification and Documentation to British and International Standards, Elsevier, 2012. (ISBN: 0080966535, 9780080966533
Electronic Materials	Drawing Software
Other Learning Materials	Blackboard Collaborate Ultra

3. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Three classrooms equipped with 50 seats and 50 drawing tables.
Technology equipment (projector, smart board, software)	Data show and multimedia
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title : Materials Science
Course Code: 211-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
Last Revision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	
3. Level/year at which this course is offered: (3rd /2nd)					
4. Course general Description:					
Material science is a core mechanical engineering subject and a prerequisite for engineering student. This course give student the fundamental information about what are inside the material by this wat student can understand different processing of materials such as mechanical testing and also deformation of materials. The conventional method of classroom interaction between the teacher and student is essential for teaching this subject. At the same time, practical experiments are conducted. All these methods are being followed and any improvement in the implementation shall be made as per the feedback of students. The communication between the teacher and student is regularly maintained and learning material is also provided through blackboard to the students.					
5. Pre-requirements for this course (if any):					
129-PHYS-4 Physics-1 107-CHEM-4 General Chemistry					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
This course covers and concentrates on principles of material science such as atomic structure and interatomic bounding, crystal structure of materials, theory of diffusion, imperfections in crystals, mechanical testing and evolution of materials, phase diagram and cooling curves of metals and alloys, iron-carbide diagram for steel and cast iron.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the phases and distinguish invariant reactions of phase diagrams	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
1.2	Classify different types of materials based on their properties	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
...				
2.0	**Skills**			
2.1	Select theories of diffusion and explain the imperfection of crystals	**PLO2.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
2.2	Assess the structure of metals on a macro/micro scale	**PLO2.3**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
...				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	4
2.	Atomic bond	6
3.	Crystal structure	8
4.	Crystals imperfection	6
5.	Atomic diffusion	6
6.	Mechanical properties and behavior	14
7.	Phase diagram Iron-iron carbide diagram	10
8.	Corrosion	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	5-6	15%
2.	Midterm Exam 2	11-12	15%
3.	Quizzes and Assignments	2, 8, 13	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	William D. Callister Jr., David G. Rethwisch, " Materials Science and Engineering", Wiley 10th Edition (2020) ISBN-10: 1119721776 ISBN-13: 978-1119721772
Supportive References	V. Raghavan, Materials Science and Engineering: A First Course 6th Edition, Kindle Edition, PHI Learning (2015) ISBN-13: 978-8120324558 ISBN-10: 8120324552
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	

DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Engineering Mechanics (Statics)
Course Code: 212-ME-2
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(2)					
2L + 0 P = 2					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered:(3rd /2nd)					

4. Course General Description:

Engineering mechanics is a foundation course to various engineering curriculum. The primary purpose of the study of engineering mechanics is to develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering. This capacity requires knowledge of the physical and mathematical principles of mechanics and the ability to visualize physical configurations. Statics involves study of forces and moments in 2D and 3D systems (which may be a beam, structure, or an object under friction etc.) under the conditions of equilibrium.

5. Pre-requirements for this course (if any):

None

6. Co-requirements for this course (if any):

None

7. Course Main Objective(s):

This course covers major topics such a Introduction to Engineering mechanics, General Principles - Force and Force Vectors, Moments, Equilibrium of a Particle - Force System and Resultants, The concept of static torsors (Center gravity and Moment of Inertia), Structural analysis, Frictionsetc. The teaching method involve theoretical lectures and tutorials on these contents.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	State the shear-bending diagram and plot the curve	**PLO1.1**	**Lectures** **Tutorials**	**Tutorials** **Midterm** **Assignment** **Final exam**
1.2	Describe the center of gravity of a rigid body	**PLO1.2**	**Lectures** **Tutorials**	**Quizzes** **Midterm** **Assignment**
1.3	Identify problems of statics of a real rigid body	**PLO1.2**	**Lectures** **Tutorials**	**Tutorials** **Midterm** **Assignment** **Final exam**
2.0	**Skills**			
2.1	Apply the basic concepts of statics, calculation of the moment, resultant force, and couples	**PLO2.1**	**Lectures** **Tutorials**	**Tutorials** **Midterm** **Assignment**
...				

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Engineering mechanics	**4**
2	General Principles - Force and Force Vectors, Moments, Couples	**3**
3	Equilibrium of a Particle - Force System and Resultants	**5**
4	Center of gravity and moment of inertia of a rigid body	**4**
5	Bending moment of a rigid body	**4**
6	Friction	**4**
7	Structural analysis	**6**
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Quiz.1	4	**5**
2	Tutorial 1	5	**5**
3	Assignment 1	6	**5**
4	Midterm 1	7	**15**
5	Quiz.2	9	**5**
6	Tutorial 2	10	**5**
7	Assignment 2	11	**5**
8	Midterm 2	12	**15**
9	Final exam		**40**
	Total		**100**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• Meriam, J. and L.G. Kraige, " Engineering Mechanics: SI Version. Statics", John Wiley and Sons Inc, 2013. (ISBN: 1118164997, 9781118164990) • R. C. Hibbeler, Engineering Mechanics: Statics, SI Units, Pearson Education, 2022 (9781292443935, 1292443936)
Supportive References	• Anthony Bedford, Wallace Fowler, Engineering Mechanics: Statics & Dynamics 5th Edition, Pearson; 5th edition (July 18, 2007) ISBN: (0136142257, 978-0136142256) • Stefan Lindström, "Lectures on Engineering Mechanics: Statics and Dynamics", Lindström Stefan 2019 ISBN: 978-91-981287-4-1 (2019)
Electronic Materials	• Blackboard lecture materials (notes and tutorials) • Video lectures and animations
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with a seating capacity of 50
Technology equipment (projector, smart board, software)	Laptop, LCD Projector, Smart Board
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of Students' assessment	Faculty and Quality Committee	Direct (Result Analysis)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Faculty and Quality Committee	Direct (through Rubrics)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: **Production technology and workshop**	
Course Code: **221-ME-3**	
Program: **Bachelor in Mechanical Engineering**	
Department: **Mechanical Engineering**	
College: **College of Engineering**	
Institution: **King Khalid University, Abha, Saudi Arabia**	
Version:: **V10**	
LastRevision Date: **21 June 2023**	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
1L + 2 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (4th /2nd)					
4. Course General Description:					
The overall aim of the present course is to explain the basics of production technology and workshop operations as well as a brief review of the engineering materials and the principals of automobile and electricity which may be useful in better understanding of the field of manufacturing technology					
5. Pre-requirements for this course (if any)**:**					
111-GE-3					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
➢ Recognize the principles of engineering drawing. ➢ Acquire imagination skills for projections of engineering parts. ➢ Master the use of engineering drawing tools.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	15
2.	**Laboratory/Studio**	60
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify processes, materials, techniques, practices, conventions, and/or terminology in mechanical engineering	PLO1.1	Lectures Tutorials Lab	Quizzes Midterm Assignment Final Exam
1.2				
...				
2.0	**Skills**			
2.1	Apply Engineering Principles and Theoretical Concepts.	PLO2.1	Lectures Tutorials Lab	Quizzes Midterm Assignment Final Exam
2.2				
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to production engineering	7
2.	Introduction to industrial safety	7
3.	Engineering materials and Their properties	7
4.	Engineering measurements	8
5.	Metal casting processes	7

6.	Sheet metal work and fitting	8
7.	Joining of metals	8
8.	Principals of machining	7
9.	Carpentry workshop	7
10.	Automotive Engg /Electrical Engg	9
	Total	75

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and Assignments	2, 8, 12	15
2.	Mid Exams I & II	Midway (8 & 13)	30
3.	Lab	Weekly	15
4.	Final Exam		30
5.	Total		100

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Textbook (s):	Understanding Environmental Pollution (2020) Marquita K. Hill Cambridge University Press ISBN-13:978-1108423083
Reference Books	1- Introduction to Environmental Engineering (2017) Mackenzie Davis McGraw-Hill Science ISBN-10:9789339204037 ISBN-13:978-9339204037 2- Fundamentals of air pollution (2014) Daniel A. Vallero ISBN-13:978-0124017337 3- GHealth and Safety at Work Revision Guide: for the NEBOSH National General Certificate in Occupational Health and Safety Ed Ferrett ISBN-10:0367482908 ISBN-13:978-0367482909 4- Air Pollution Control: A Design Approach C. David Cooper, F. C. Alley ISBN-13:978-1577666783
Supportive References	Lectures and Videos
Electronic Materials	Blackboard Collaborate Ultra
Other Learning Materials	Blackboard Collaborate Ultra

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Three classrooms equipped with 50 seats and 50 drawing tables.
Technology equipment (projector, smart board, software)	Data show and multimedia
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Engineering Programming
Course Code:222-GE-2
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date: 7October 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
1L + 1 P = 2					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (4^{th} /2^{nd})					
4. Course General Description:					
In this course, students learn how to program in Python to solve engineering problems. In order to perform numerical computations in their field of study in mechanical engineering, the students must undergo rigorous training in logic development and computer programming.					
5. Pre-requirements for this course (if any)**:**					
103-CMS-3 Computer Science					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					

Upon completion of this course, it is expected that the students will be able to:

- **Understand the programming basics in Python (operations, control structures, data types, etc.).**
- **Understand various data types and control structure in Python.**
- **Gain proficiency in using Python modules and libraries for scientific computing and data analysis.**
- **Evaluate the outcome of Python code.**
- **Develop the ability to collaborate with others to read and write Python programs for mechanical engineering applications.**
- **Apply computer programming in Python to solve engineering problems.**
- **Improve problem-solving skills using computational methods.**

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Express the programming basics in Python	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
1.2				
…				
2.0	**Skills**			
2.1	Use various data types and control structures in Python	**PLO2.4**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
2.2	Develop proficiency in using Python modules and libraries for scientific computing and data analysis	**PLO2.4**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.3	Evaluate the outcome of Python code	**PLO2.4**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.4	Apply computer programming in Python to solve engineering problems	**PLO2.4**	**Lectures Tutorials Lab**	**Quizzes Lab Midterm Assignment**
...				
3.0	**Values, autonomy, and responsibility**			
3.1	Discuss with others to read and write Python programs for mechanical engineering applications	**PLO3.2**	**Lectures Tutorials Lab**	**Quizzes Lab Midterm Assignment Final**
3.2	Improve problem-solving skills using computational methods	**PLO3.3**	**Lectures Tutorials Lab**	**Quizzes Lab Midterm Assignment Final**
3.3				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Python	**3**
2.	The Core Python Language I	**11**
3.	Simple Plots and Charts	**3**
4.	The Core Python Language II	**3**
5.	NumPy	**8**
6.	Matplotlib	**3**
7.	SciPy	**6**
8.	Pandas	**8**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments/Quizzes/Project	**Weekly**	**35%**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam	6 - 12	25%
3.	Final Exam		40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Learning Scientific Programming with Python 2nd Edition (2020) Christian Hill. ISBN-10:1108745911 ISBN-13: 978-1108745918
Supportive References	1- Applied Numerical Methods with Python for Engineers and Scientists (2021) Steven Chapra and David Clough ISBN10: 1265017964 ISBN13: 978-1265017965 2- Python 3.11.2 documentation, the book is available freely on the official website at (https://docs.python.org/3.11/). 3- Starting Out with Python (2021) Tony Gaddis ISBN-10:1292408634 ISBN-13:978-1292408637 Python and other contemporary programming languages have extensive online documentation. They were created with the expectation that programmers would interact with this documentation frequently and wouldn't need to recall more than a small amount of it. As a result, this course's background will draw on a variety of readily accessible web resources. Lecture Handouts
Electronic Materials	Python 3.11.2 documentation, (https://docs.python.org/3.11/).
Other Learning Materials	Blackboard Collaborate Ultra

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Computer lab
Technology equipment (projector, smart board, software)	Projector, Python Programing Language

Items	Resources
Other equipment (depending on the nature of the specialty)	Access to computer lab with Python 24/7

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students'assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved		
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Thermodynamics-1
Course Code: 222-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (4th /2nd)					
4. Course general Description:					
This course deals with the fundamental principles of thermodynamics such as heat, work, thermodynamic systems, and the first and second laws of thermodynamics and their applications on thermodynamics engineering problems. Also, this course presents a number of examples and problems concern to processes that occur in some equipment such as power plants, vapor compression refrigerators, thermoelectric coolers and rocket engines.					
5. Pre-requirements for this course (if any):					
129-PHYS-4 Physics-1 **119-MATH-3 Differentiation and Integration**					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
This course covers and concentrates on principles of thermodynamics such as describing what information the First Law of Thermodynamics provides about the "directionality", or "tendency", of physical and chemical changes.To state the First and second Laws of Thermodynamics and describe their significance.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basic principles of thermodynamics	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
1.2	State and analyze data through experiments based on principles of thermodynamics	**PLO1.3**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
...				
2.0	**Skills**			
2.1	Devise the concept of energy and define its various forms	**PLO2.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
2.2	Apply the first law of thermodynamics to various systems	**PLO2.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Use the appropriate formulas and solve the engineering problems based on thermodynamic principles	**PLO2.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
3.0	**Values, autonomy, and responsibility**			
3.1				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	4
2.	Fundamental concepts and definitions	6
3.	Properties of pure substances	6
4.	Work and heat	6
5.	First law of thermodynamics and its applications	4
6.	The second law of thermodynamics	14
7.	Air-standard Brayton cycle	10
8.	Entropy, reversibility, and irreversibility	6
9.	Applications of steady state and steady flow	2
10.	Uniform flow and some processes	2
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes and Assignments	2, 8, 13	15%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Lab	Every week	15%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Thermodynamics: An Engineering Approach ISE (2023) Yunus A. Cengel Dr. , Michael A. Boles, et al. ISBN-10 :1266152113 ISBN-13 :978-1266152115.
Supportive References	Fundamentals of Engineering Thermodynamics 9th edition (2018) Moran, Michael J. ISBN 10: 1118412931 ISBN 13:9781119721437
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:Strength of Materials and Testing
Course Code:223-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (4th /2nd)					
4. Course General Description:					
ME223, Strength of Materials and testing is a 3-credit course designed to students at their fourth level in their respective colleges. This course is an initiation to the mechanical engineering design based on the general concept of stress and strain. The objective of this course is that the student acquires the basis of Elasticity and Strength of Materials, such as general assumptions and hypothesis for strength of materials theories; different types of loading; normal stress and strain; mechanical properties of materials; Shear stress and strain; analysis of stress and deformation in axially loaded members, Torsion formula in circular shafts; pure bending, shear force and bending moment diagram; stress and strain transformations, MOHR's circle.					
5. Pre-requirements for this course (if any)**:**					
Materials Science 211-ME-5					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course covers and concentrates on principles of material science such as atomic structure and interatomic bounding, crystal structure of materials, theory of diffusion, imperfections in crystals, mechanical testing and evolution of materials, phase diagram and cooling curves of metals and alloys, iron-carbide diagram for steel and cast iron.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance e-learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the general objectives of strength of materials	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
1.2	Relate internal loads and the type of loading	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
...				
2.0	**Skills**			
2.1	Calculate normal stress and shear stress	**PLO2.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
2.2	Analyze simple design problems	**PLO2.2**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
...				
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to strength of materials and static review, general objective and assumptions of strength of materials, internal loads, different types of loading	8
2.	Tension, compression, normal stress, normal strain, mechanical properties, Hooke's law, Poisson ratio, allowable stress	7
3.	Deformation of Axially Loaded Members, thermal stress and Thermal Strain	7
4.	Shear stress, Shear strain, Hooke's law, shear modulus	8
5.	Torsion formulas, polar moment, Angle of Twist , Torsion of Solid Non-Circular Sections, Thin walled pressure vessels, longitudinal and transversal stresses in cylindrical vessels, stress in spherical vessels	7
6.	Pure bending, bending stress, moment of inertia of sectional area, radius of gyration	7
7.	Shear Force and Bending Moment diagram	8
8.	Stress and strain transformations, General equations of plane stress and strain Principal Stresses, Maximum in-plane shear stress and strain, Mohr's Circle, Triaxial stress and strain, Absolute Maximum shear strain	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz-1, Quiz-2 & Quiz-3	**6-10-12**	**15**
2.	Midterm-1 & Midterm-2	**7-13**	**30**
3.	Lab and Report	**13**	**15**
4.	Final Exam		**40**
	Total		**100**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1. Mechanics of Materials, SI Edition (2023) Russell C. Hibbeler ISBN10: 1292725737 ISBN13: 978-1292725734 2. Mechanics of Materials 8th Edition (2020) Ferdinand Beer, E. Johnston, John DeWolf and David Mazurek ISBN10: 1260113272 ISBN13: 9781260113273

Supportive References	Mechanics of Materials, Hardcover – April 1, 2010, by Russell C. Hibbeler (Author) ISBN-13: 978-0136022305 ISBN- 10: 0136022308
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom Mode: • Classroom with 50 seats • Laboratory with 25 seats E-Learning mode • Laptop/Desktop, internet connectivity Audio-visual system, mic, headphone
Technology equipment (projector, smart board, software)	• Laptop / Computer system Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Metal Cutting Processes
Course Code: 311-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2L + 2 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered:(5th/3rd)					
4. Course General Description:					
This course aims to cover the principles of the conventional machining processes, the different conventional machining operations, the tool and work piece fixation methods, the machine specifications, and the kinematic systems represent main items in this course. Furthermore, the course includes finishing operations and engineering metrology. This course covers the determination of cutting forces (graphically and numerically), and the estimation of the machining times in each operation. Also, it covers the chip breakers in machining and the concept of machinability and its improvement. This course aims to prepare the student to effectively using the non-conventional machining methods.					
5. Pre-requirements for this course (if any)**:**					
211ME-3 Materials Science 221ME-3 Production Technology and Workshop					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
The main aim of this course is to make the students to understand the basic knowledge needed for engineers in the field of conventional and non-conventional machining and develop his information in estimation of machining times and planning of the suitable technological procedures for some machining operations.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning	-	
3	Hybrid • Traditional classroom	-	

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning	-	

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basics and fundamentals of machining metals and alloys	**PLO1.1**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**
1.2	Outline the features and details of each machining technique	**PLO1.1**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**
2.0	**Skills**			
2.1	Use machines to shape jobs of various materials	**PLO2.3**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Estimate the machining times and the machining forces for a job	PLO2.3	Lecture Discussion Self-learning	Quizzes Midterm Assignment Final
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate ability to work in teams to machine some components	PLO3.2	Lecture Discussion Self-learning	Quizzes Midterm Assignment Final
3.2	Show self-confidence to work without supervision	PLO3.2	Lecture Discussion Self-learning	Quizzes Midterm Assignment Final
...				

C. Course Content

No	List of Topics	Contact Hours
1	Definitions and basics of manufacturing processes; Classification of manufacturing processes; Definition and purpose of machining.	4
2	Tool-Work motions and elements of machining for different machining operations.	4
3	Tool Geometry of single point cutting tool; Tool signature and tool nomenclature by American standard Association system (ASA).	4
4	Rake Angle, clearance angle and its significance; Metal cutting operation, formation, and types of chips.	6
5	Shear Angle and Geometry of chip formations; Mechanics of chip formation, Relationship between Velocity of cut (Vc), Flow velocity (Vf) and Shear velocity (Vs); Numerical problem based on these relationships.	6
6	Tool materials commonly used for single point cutting tools and its properties; Cutting fluids: types, application, properties	5

7	Tool wear and Tool Life, Taylor's tool life equation and tool life plots; Problems based on tool life.	**5**
8	Definition, classification, and basic elements of machine tools; Kinematics of center lathe machine; common turning operation performed on lathe machine; Numerical problems based on machining time.	**4**
9	Hole-making operations: Drilling, Reaming, Boring, Tapping operations, twist drill geometry; types of drills; drilling machine; drilling time	**4**
10	Reciprocating machine tools: shaper, planning machine and slotting operations, milling machine: types, operations, mechanics, milling time	**4**
11	Abrasive processes: Grinding, Honing, Lapping; grinding wheel designation and selection; types of grinding machines and process parameters	**4**
12	Non-conventional machining process: Electric Discharge Machining, Electro Chemical Machining	**4**
13	Ultrasonic Machining, Laser Beam Machining, Plasma Arc Machining, Abrasive Water Jet Machining	**4**
14	Revision	**2**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Quiz.1	4	**5**
2	Assignment 1	6	**5**
3	Midterm 1	7	**15**
4	Quiz.2	9	**5**
5	Assignment 2	11	**5**
6	Midterm 2	12	**15**
7	Lab Report	13	**5**
8	Lab Exam	14	**5**
9	Final exam		**40**
	Total		**100**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• SeropeKalpakjian and Steven R Schmid, "Manufacturing Processes for Engineering Materials", Pearson Education Limited, 2008 • David A. Stephenson, John S. Agapiou, "Metal Cutting Theory and Practice "Taylor & Francis Group, 2006
Supportive References	• Benjamín W. Niebel, Alan B. Draper, Richard A. Wysk, "Modern Manufacturing Process Engineering", McGraw-Hill, 2002 • Mikell P. Groover, "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", John Wiley & Sons, 2010
Electronic Materials	• Blackboard lecture materials (notes and tutorials) • Video lectures and animations
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with a seating capacity of 50
Technology equipment (Projector, smart board, software)	Laptop, LCD Projector, Smart Board
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of Students' assessment	Faculty and Quality Committee	Direct (Result Analysis)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Faculty and Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Mechanical Engineering Drawing
Course Code: 312-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
Last Revision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
1L + 2 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (5^{th} /3^{rd})					
4. Course General Description:					
This course covers an overview of orthographic projections and sectional views, standards and conventions in drawing and dimensioning, detailed and assembly drawings, and computer-aided design using SOLIDWORKS SOFTWARE.					
5. Pre-requirements for this course (if any):					
Engineering Drawing 111-GE-3					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
To enable students to recognize and create assembly drawings as well as illustrate and interpret engineering drawing standards used for assembly drawings. Use the SolidWorks mechanical design automation software to build parametric models of parts and assemblies, and how to make drawings of those parts and assemblies.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	60
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Sketch different types of sections in machine drawings	**PLO1.1**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**
2.0	**Skills**			
2.1	Use CAD software, such as SolidWorks software, in machine drawing	**PLO2.4**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**
...				
3.0	**Values, autonomy, and responsibility**			
3.1	Use SolidWorks Software with confidence and design/draft the new innovative parts	**PLO3.3**	**Lecture Discussion Self-learning**	**Quizzes Midterm Assignment Final**
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	3
2.	Conventional Practices for Orthographic Projections and Sectional Views	5

	a. Conventional Practices in Orthographic views: Half Views, Partial Views, and Aligned Views. b. Conventional Practices in Sectional views: Conventions for Ribs, Webs, Spokes, and lugs in Full Sectional View, Broken Section, Removed Section, Revolved Section, Offset Section, and Auxiliary Sectional Views. Simplified Representations of Standard Machine Elements.	
3.	Standards and Conventions in Drawing and Dimensioning a. Limits, Fits and Tolerances, Symbols, and Surface Finish. b. Threads, Bolts and Nuts. Welded and Riveted Joints.	12
4.	Detailed and assembly Drawings a. Working Drawings and its Components. b. Detailed Drawings. c. Assembly Drawings. Practices of Detailed and Assembly Drawings.	15
5.	Computer Aided Drawing (CAD) a. Isometric Drawing (Parts). b. Assembly Drawing. c. Creating 2D drawings from a part or an assembly. Dimensioning Drawings.	40
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes, Assignments, Project	6, 13	10%
4.	Classwork	Every week	20%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Computer-Aided Design and Manufacturing (Wiley-ASME Press Series) (2020) Zhuming Bi and Xiaoqin Wang Wiley ISBN-13 : 978-1119534211 2- Engineering & Computer Graphics Workbook Using SolidWorks 2019 Ronald Barr, Davor Juricic, Thomas Krueger ISBN-10:1630572195 ISBN-13: 978-1630572198
Supportive References	1-Colin Simmons and Dennis Maguire, "Manual of Engineering Drawing Practice ",2nd ed., 2004. 2-Learn SOLIDWORKS: Get up to speed with key concepts and tools to become an accomplished SOLIDWORKS Associate and Professional, 2nd Edition (2022) Tayseer Almattar ISBN-10: 1801073090 ISBN-13: 978-1801073097
Electronic Materials	Instructor has prepared videos for students to improve their CAD software skills
Other Learning Materials	Lecture Handouts

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 24 seats
Technology equipment (projector, smart board, software)	Computer Lab, SOLIDWORKS Software LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect (through university experience and mission-vision-PEO surveys)

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Engineering Mechanics (Dynamics)**
Course Code:	**313-ME-2**
Program:	**Bachelor in Mechanical Engineering**
Department:	**Mechanical Engineering**
College:	**College of Engineering**
Institution:	**King Khalid University, Abha, Saudi Arabia**
Version: 10	
Last Revision Date21: June 2023	

Table of Contents:

A. General information about the course:

1. Credit hours: (2)

2L + 0 P =2

2. Course type

A.	☐University	☐College	■ Department	☐Track	☐Others
B.	■ Required		☐Elective		

3. Level/year at which this course is offered: (5th /3rd)

4. Course General Description:

This course aims to make the students

- **Understand the laws of motion, the kinematics of motion and the interrelationship.**
- **Write the dynamic equilibrium equation.**
- **Understand the concepts of kinetics and solve engineering problems.**

5. Pre-requirements for this course (if any):

212-ME-2: Engineering Mechanics (Statics)

6. Pre-requirements for this course (if any):

None

7. Course Main Objective(s):

Upon completing this course, it is expected that the students will be able to:

- **State the principles of dynamics and outline the principles for the idealizations of Statics and Dynamics**
- **Apply the principles of dynamics to solve engineering problems**
- **Evaluate and illustrate basic engineering problems independently or in a group**

1. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	30	100
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	--
3.	Field	--
4.	Tutorial	--
5.	Others (specify)	--
	Total	30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Discuss the concepts of the Work-Energy principle, Impulse-Momentum principle	PLO1.2	• Lectures • E learning Tutorials	• Assignments • Homework • Mid and Final Tutorial sheets
1.2	Discuss the basics of kinematics concepts – displacement, velocity, and acceleration	PLO1.2	• Lectures • E learning • Tutorials	• Assignments • Homework • Mid and Final • Tutorial sheets
2.0	Skills			
2.1	Apply the principles for the idealizations of Statics and Dynamics problems	PLO2.1	• Lectures • E learning • Tutorials	• Assignments • Mid and Final • Tutorials sheets
2.2	Apply Newton's laws of motion to dynamics problems	PLO2.1	• Lectures • E learning Tutorials	• Assignments • Homework • Mid and Final Tutorial sheets
2.3	Develop Freebody diagrams to evaluate dynamic problems of particle and rigid body	PLO2.2	• Lectures • E learning • Tutorials	• Assignments • Homework • Mid and Final • Tutorial sheets
2.4	Evaluate basic engineering problems independently	PLO2.1	•	•
3.0	Values, autonomy, and responsibility			
3.1	Illustrate problems of dynamics in groups	PLO3.2	• Lectures • E learning Tutorials	• Assignments • Homework • Mid and Final Tutorial sheets

C. Course Content

No	List of Topics	Contact Hours
1	Introduction	2
2	Center of gravity and Moment of Inertia	2
3	Moment of Inertia (Tutorials)	2
4	Kinematics of Particles	2
5	Kinematics of Particles-Rectilinear Motion	2
.6	Kinematics of Particles-Projectiles	2
7	Kinematics of Particles-Curvilinear Motion	2
8	Kinetics of Particles - Force-and-Acceleration	2
9	Kinetics of Particles - Work-and-Energy	3
10	Kinetics of Particles - Impulse-and-Momentum	2
11	Planar Kinematics of Rigid Bodies	3
12	Planar Kinetics of Rigid Bodies	2
13	Free Vibration of Particles	2
14	Revision	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Midterm Exam I	7-8	15% (15 Marks)
2	Midterm Exam II	12-13	15% (15 Marks)
2	Assignments	2,4,8	10% (10 Marks)
3	Quiz	5,9	10% (10 Marks)
4	Homework	3,5,9,12	10% (10 Marks)
5	Final Exam		40% (40 Marks)

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- ISE Vector Mechanics for Engineers: Statics and Dynamics Ferdinand P. Beer, E. Russell Johnston Jr., David Mazurek ISBN-10:1260085007 ISBN-13:978-1260085006 2- Engineering Mechanics: Dynamics, SI Unit (2023) Russell Hibbeler ISBN-10:1292451939 ISBN-13:978-1292451930
Supportive References	1-Engineering Mechanics: Statics & Dynamics 5th Edition (2007) Anthony Bedford, Wallace Fowler ISBN: (0136142257, 978-0136142256) 2-Engineering Mechanics: Dynamics (2015) James L. Meriam, L. G. Kraige, J. N. Bolton , ISBN-10:1118885848 ISBN-13:978-1118885840
Electronic Materials	--
Other Learning Materials	Lecture Handouts

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with45 seat Conventioanl machining laboratory
Technology equipment (projector, smart board, software)	Multimedia teaching Laptop / Computer system Blackboard, LCD Projector, speakers
Other equipment (depending on the nature of the specialty)	Calculators

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved		
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Theory of Machines	
Course Cod : 321-ME-3	
Program: Bachelor of Science in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)	
2L + 1 P = 3	
2. Course type	

A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	

3. Level/year at which this course is offered: (6th/3rd)

4. Course general Description:

This course covers the introduction and types of links, joints, pairs, degree of freedom, the types of mechanisms and velocity analysis in a mechanism using graphical method. It also includes the design of cams and analysis of gears and governors.

5. Pre-requirements for this course (if any)**:**

212-ME-3 Engineering Mechanics (Statics)
313-ME-3 Engineering Mechanics (Dynamics

6. Co-requirements for this course (if any)**:**

Nil

7. Course Main Objective(s):

To enable students to understand, define, classify, design, and analyze different types of mechanisms.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	30
5.	Others (specify)	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define basic concepts of links, degree of freedom, machines and mechanisms, types of cam & followers, different types of Gears and Governors	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Discuss problems on Gears and Governors	**PLO1.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Calculate the velocity and accelerations of basic mechanisms	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Construct the displacement diagram and cam profile	**PLO2.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.3	Evaluate mechanisms for different applications	**PLO2.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
3.1				

C. Course Content

No	List of Topics	Contact Hours

1.	**Introduction** Links, Joints, Pairs, Degree of Freedom, Difference between Structures, Mechanisms and Machines. Simple and Complex Mechanisms.	8
2.	**Mechanisms** Analysis of Mechanisms, Four Bar Mechanisms, Crank and Slider Mechanisms, Crank and Slotted Lever Quick Return Mechanism, Whitworth Quick Return Mechanism.	10
3.	**Analysis of Velocity in Mechanisms** Velocity of a point on a link, Linear and Angular Velocity of Links, Velocity Analysis using graphical methods for Four Bar Mechanism, Crank and Slider Mechanism, Complex Mechanism.	12
4.	**Analysis of CAM and Follower Mechanisms** Introduction to types of CAMs and Followers, Analysis of Roller and Knife Edge Followers with Uniform Velocity, Simple Harmonic Motion (SHM), Uniform Acceleration and Retardation, Cycloidal Motion, Radial and Offset CAMs.	12
5.	**Gears** Different types of Gears, Analysis of Simple and Compound Gears, Gear Trains, Internal and External Gears, Inverted Gears, Epicyclic Gears.	10
6.	**Governors** Introduction to Governors, Types of Governors, Watt and Porter Governors.	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Exams	7,11	30%
2.	Assignments	4,6	10%
3.	Quizzes	2,3,5,8,9	10%
4.	Tutorials / Lab	2,4,6,7,8,10, 12	10%
5.	Final exam		40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- The Theory of Machines by Robert William Angus Publication Year: 2023

	ISBN-10: 1019474270 ISBN-13: 978-1019474273 2- Theory of Machines by R.S. Khurmi and J.K. Gupta Latest Edition: 14th Edition Publication Year: 2005 Publisher: S Chand & Co Ltd ISBN-10: 8121925244 ISBN-13: 978-8121925245
Supportive References	1. Theory of Machines and Mechanisms by John J. Uicker Jr., Gordon R. Pennock, and Joseph E. Shigley Latest Edition: 4th Edition Publication Year: 2010 Publisher: Oxford University Press ISBN-10: 019515598X ISBN-13: 978-0195155983 2. Theory of Machines by Thomas Bevan Latest Edition: 5th Edition Publication Year: 1997 Publisher: Longman ISBN-10: 0582094785 ISBN-13: 978-0582094785 3. Mechanisms and Dynamics of Machinery by Hamilton H. Mabie, Charles F. Reinholtz, and Joseph E. Shigley Latest Edition: 4th Edition Publication Year: 1987 Publisher: Wiley ISBN-10: 0471802379 ISBN-13: 978-0471802372 4. Theory of Machines by S.S. Rattan Latest Edition: 4th Edition Publication Year: 2010 Publisher: McGraw-Hill Education ISBN-10: 0070672636 ISBN-13: 978-0070672634
Electronic Materials	Lecture notes on blackboard,Videos
Other Learning Materials	Nil

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroomwith25 seats
Technology equipment (projector, smart board, software)	• Laptop / Computer system • Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	Nil

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect through surveys
Effectiveness of Studentsassessment	Students	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Faculty	Direct through Examinations
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	Nil
DATE	22.08.2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:Fluid Mechanics
Course Code:322-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:25Sept. 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)	
2L + 1 P = 3	
2. Course type	
A. ☐University ☐College ■Department ☐Track ☐Others	
B. ■Required ☐Elective	
3. Level/year at which this course is offered: (6th /3rd)	
4. Course General Description:	
It gives the students the tools to understand the fluid behavior and how to apply fluid mechanics laws to real life applications.	
5. Pre-requirements for this course (if any)**:**	
222-ME-3 Thermodynamics-1	
6. Pre-requirements for this course (if any)**:**	
7. Course Main Objective(s):	
It's to introduce the main topics of fluid mechanics to mechanical engineering students.	

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basic concepts of fluid mechanics	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Discuss and analyze data through experiments in fluid mechanics.	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Use of engineering judgment through practical experiments in fluid mechanics	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
3.1				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	10
2.	Fluid definition -Dimensions and units	6
3.	Fluid properties	8
4.	Fluid Statics	8
5.	Buoyancy and Stability of floating body	6

6.	Fluid Kinematics	8
7.	Fluid Dynamics	8
8.	Energy Principles	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homeworks	3,6,9,12,13	5%
2.	Midterm	6	15%
3.	Midterm	11	15%
4.	Quizzes	4,7,11	5%
5.	Lab Reports	4,6,8,10,12,13	10%
6.	Lab Exam	14	5%
7.	Project	14	5%
8.	Final Exam		40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Fluid Mechanics: Fundamentals and Applications (COLLEGE IE OVERRUNS) (2018) Yunus Cengel and John Cimbala, "ISBN-10 0073380326 ISBN-10: 1259921905 ISBN-13:978-1259921902
Supportive References	ISE Fluid Mechanics (2021) Frank M. White ISBN-10:1260575543 ISBN-13: 978-1260575545
Electronic Materials	Related softwares
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms, laboratories, exhibition rooms, simulation rooms
Technology equipment (projector, smart board, software)	projector, smart board
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of Studentsassessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	**25/09/2023**

Field Experience Specification
(Bachelor)

Course Title: **Summer Training**	
Course Code: **400 ME-0**	
Program: **Bachelor in Mechanical Engineering**	
Department: **Mechanical Enginerring**	
College: **College of Engineering**	
Institution: **King Khalid University**	
Field Experience Version Number: **2**	
Last Revision Date: 03-10-2025	

Table of Contents

A. Field Experience Details:

1. Credit hours: (0 Credit).		
2. Level/year at which Field Experience is offered: (7/8/9/10th level / 4/5th year).		
3. Time allocated for Field Experience activities		
(8)Weeks	(5)Days	(8)Hours
4. Corequisite (or prerequisites, if any) to join Field Experience		
Completion of all coursework up until year three.		
5. Mode of delivery		
☒ In-person/onsite	☒ hybrid (onsite/online)	☐Online

B. Field Experience Course Learning Outcomes (CLOs), Training Activities and Assessment Methods

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
1.0	**Knowledge and understanding**				
1.1	Outline various technical aspects of the program in the summer training	PLO1.3	Progress report, Final presentation	Maximum marks	Average value
…					
2.0	**Skills**				
2.1	Apply knowledge and skills to solve problems.	PLO2.1	Final report, Progress report, Final presentation , Final Evaluation	Maximum marks	Average value
2.2	Develop critical thinking for creating novel solutions to the problems	PLO2.2	Final report, Progress report, Final presentation , Final Evaluation (Company)	Maximum marks	Average value
3.0	**Values, autonomy, and responsibility**				

Code	Learning Outcomes	Aligned PLO Code	Training Activities	Assessment Methods	Assessment Responsibility
3.1	Distinguish between professional and ethical responsibilities	PLO3.1	Final presentation , Final Evaluation	Maximum marks	Average value
3.2	Co-operate in multidisciplinary teams	PLO3.2	Final presentation , Final Evaluation	Maximum marks	Average value

*Assessment methods (i.e., practical test, field report, oral test, presentation, group project, essay, etc.).

C. Field Experience Administration

1. Field Experience Flowchart for Responsibility

Including units, departments, and committees responsible for field experience identifying by the interrelations.

Teaching Staff →Assessing student through various visiting, weekly report, Final report , Presentation.
Field Supervisor→ Assessing student through Student's performance evaluation form.

2. Distribution of Responsibilities for Field Experience Activities

Activities	Department or College	Teaching Staff	Student	Training Organization	Field Supervisor
Selection of a field experience site	√		√		√
Selection of supervisory staff	√			√	√
Provision of the required equipment	√			√	
Provision of learning resources	√			√	
Ensuring the safety of the site	√	√	√	√	√
Commuting to and from the field experience site			√		
Provision of support and guidance	√	√			√
Implementation of training activities (duties, reports, projects ...)	√	√		√	
Follow up on student training activities		√			√
Monitoring attendance and leave		√			√
Assessment of learning outcomes		√			
Evaluating the Quality of Field Experience		√			√
Others (specify)					

3. Field Experience Location Requirements

Suggested Field Experience Locations	General Requirements*	Special Requirements**
University project management Ben Laden Saudi group Abha Airport King Khalid Military City Water Services Directorate General Directorate of Water in al shqakq Jazeera Paints General Directorate of Water in Khamis Mushait Region Saudi Electricity Company Aramco Royal Commission in Jubail	- labs and learning resources - Availability of modern software and hardware - Availability of modern equipment - The availability of specialized technical centers	- Must cover the basic disciplines of electrical engineering - Must provide a better and latest software and hardware - Must provide a better and latest equipment - Must provide the latest techniques and specialized programs in the same field

* E.g., Provides information technology, equipment, laboratories, halls, housing, learning sources, clinics … etc.
** E.g., Criteria of the institution offering the training or those related to the specialization, such as safety standards, dealing with patients in medical specialties … etc.

4. Decision-Making Procedures for Identifying Appropriate Locations for Field Experience

The application by the student is accepted if the student satisfies his credits before 6th level and he is not registered any courses in summer term , otherwise it is rejected.

5. Safety and Risk Management

Potential Risks	Safety Actions	Risk Management Procedures
The expulsion of training without compelling reasons	Contract an agreement with the company.	Select companies with an agreement in advance.
Injury the trainee during summer training	Contract an agreement with the company.	Select companies with an agreement in advance.
Claim the college with the financial receivables	Contract an agreement with the company.	Select companies with an agreement in advance.

D. Training Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Teaching staff, workload, training program effectiveness and appropriateness, and quality of learning resources employed	Students	Training Evaluation Form

Evaluation areas (e.g., Effectiveness of Training and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Supervisory Staff, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

E. Specification Approval Data

Council /Committee	Approval by quality committee
Reference No.	QC/02/2025
Date	03/10/2025

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Machine Elements Design-1	
Course Code: 411-ME-3	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: ($7^{th}/4^{th}$)					
4. Course General Description:					
This course contains an overview of different types of stresses, materials selection, failure theories, and design of joints. It also covers the design of different machine elements.					
5. Pre-requirements for this course (if any)**:**					
Strength of Materials & Testing 223-ME-3, Mechanical Engineering Drawing 312-ME-3					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
Recognize the difference between theory and the applied design. Know different design theories and their applications. Analyze forces and calculate principal stresses. Acquire skills in designing simple machine parts. Acquire skills in using computer in design and drawing					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance e-learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	

3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Distinguish between theory and the applied design	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Apply engineering analysis principles and methods to the proper analysis of a variety of common mechanical system components	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Design mechanical system components so as to perform safely their intended functions in harmony with other components of the system	**PLO2.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
3.1	Use information resources to identify appropriate and elegant component solutions for mechanical system design problems, locate sources for these components, and understand the analysis and design methods for these components	**PLO3.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to design processes, types of stresses, and material selection, Failure theories: static and dynamic.	2
2.	Design of joints: riveted, welded, screwed, and cotter and knuckle joints	2
3.	Couplings design: rigid and flexible	4
4.	Clutches design.	14
5.	Brakes design	8
6.	Springs design	8
7.	Chain drives	14
8.	Power screws design	8
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz-1, Quiz-2 & Quiz-3	6-10-13	15
2.	Midterm-1 & Midterm-2	7-12	30
3.	Tutorial	Weekly	10
4.	Assignments	6, 11	5
5.	Final Exam		40
	Total		100

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Khurmi, R.S. & Gupta, J.K., "Machine Design", Eurasia Publishing House, 14th Edition (2005) ISBN-10: 8121925371 ISBN-13: 978-8121925372 2- Shigley's Mechanical Engineering Design (2020) Keith J. Nisbett Richard G. Budynas McGrowHill ISBN-10:9390219639 ISBN-13: 978-9390219636
Supportive References	1- Fundamentals of Machine Components Design (7th Edition) (2020) Robert C. Juvinall& Kurt M. Marshek John Wiley & Sons Inc., ISBN-10: 1119723604

	ISBN-13: 978-1119723608 2-Mechanical Design of Machine Elements (2023) Özgen Ü. Çolak ISBN-10:975040971X ISBN-13:978-9750409714 3- Marks' Standard Handbook for Mechanical Engineers, 12th Edition (2017) Ali M. Sadegh and William M. Worek ISBN-10: 1259588505 ISBN-13: 978-1259588501
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom Mode: • Classroom with 50 seats • Laboratory with 25 seats E-Learning mode • Laptop/Desktop, internet connectivity Audio-visual system, mic, headphone
Technology equipment (projector, smart board, software)	• Laptop / Computer system Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	

DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Metal Forming Processes
Course Code: 412-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2L + 1 P = 3

2. Course type

A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		

3. Level/year at which this course is offered: (7th /4th)

4. Course General Description:

This course covers an introduction to casting technology. Different melting furnaces used in casting. Quality control in sand casting. Permanent die casting Investment casting. Continuous casting. Plastic deformation processes. Extrusion and rolling process of metals. Different types of Forging techniques and methods of metals. Introduce students to Welding technology. Develop knowledge about polymer processing as well as materials characterizations techniques.

5. Pre-requirements for this course (if any):

211-ME-3
221-ME-3

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

To equip students with the fundamental principles of key manufacturing processes, including metal forming, casting, and welding.
It focuses on analyzing the mechanics of operations like forging, extrusion, and rolling to understand material behavior and force requirements.
The course also covers associated technologies such as casting methods, welding, and introductory polymer processing.
The ultimate goal is to apply this knowledge to select, design, and control industrial processes for producing high-quality components.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	State principles of the forming properties such as fusibility, plasticity, and ductility and choosing the proper processes forming methods	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	List various casting processes and Forming Processes	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Compare various composite fabrication processes	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
3.1	Show self-confidence to work without supervision in production lab	**PLO3.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Demonstrate ability to work in teams to weld different materials	**PLO3.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to casting and different casting techniques. Molding materials and their properties. Sand casting technology, Melting furnaces.	2
2	Solidification of pure metals and alloys. casting defects. Quality control in sand casting. Permanent die casting, Investment casting. Continuous casting.	6
3	Introduction to plastic deformation processes. Extrusion process of metals, Types of Extrusion, Characteristics of extrusion, Extrusion Machines Die Design , Defects , materials, Applications, Numerical Problems.	6
4	Forging of metals, Types of forging process , Forging Equipment's, Defects, Die Design , Forging materials, Applications, Numerical Problems. Principles of Rolling process, Types Rolling process and machines, Defects, Advantages, Applications Numerical Problems.	6
5	Introduction to welding and different welding processes. Soldering, brazing techniques. Fusion welding processes, shielded metal arc welding, Gas metal arc welding, Gas tungsten arc welding. Solid state welding. Welding defects, Welding inspection, Welding symbols.	6
6	General Introduction about material fabrication techniques.	6
7	Introduction to ceramics, types of ceramics, forming techniques of glass ceramics, Casting, spinning, pressing, Blowing, drawing, production of glass fibers, Heat treatment of glasses. Fabrication of clay products; Hydro plastic forming, slip casting, Powder pressing, tape casting.	6
8	Introduction to Polymer Additives.	4
9	Introduction to Fabrication of polymers Extrusion, injection molding, blow molding, Thermoforming, compression molding, Casting, vacuum forming.	6
10	Micro/Nano Injection molding	4
11	Additive Manufacturing Technology (3D Printing)	4
12	Introduction to Materials Characterizations Techniques	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	11-12	10%
3.	Quizzes, Project and Assignment	2, 8, 3	20%
4.	Lab	Weekly	15%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Degarmo, E.P., Black, J.T., and Kohser R. A., "Materials and Processes in Manufacturing", 9th, Edition, 2002. 2- Kalpakjian, S. & Schmid, S.R., "Manufacturing Engineering and Technology", 6th ed. Prentice Hall, 2009. 3- Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 4th Edition (ISBN 978-0470-467002). 4- J.P. Beaumont, M. Smith, Runner and gating design handbook: tools for successful injection molding, 3rd ed., Hanser Publications, Cincinnati, 2019.
Supportive References	1- V. Raghavan, Materials Science and Engineering: : A First Course 6th Edition, Kindle Edition, PHI Learning (2015) ISBN-13: 978-8120324558 ISBN-10: 8120324552 2- M.-L. Wang, R.-Y. Chang, C.-H. Hsu, Molding simulation: theory and practice, First edition, Hanser Publishers/Munich Hanser Publications, Cincinnati, 2018. 3- Kazmer, Injection mold design engineering, 2nd edition, Hanser Publications, ; Hanser Publishers, Munich : Cincinnati : Munich, 2016
Electronic Materials	
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title:Heat Transfer
Course Code: 413-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (7th /4th)					
4. Course General Description:					
It gives the students the tools to understand the heat transfer behavior and how to apply heat transfer laws to real-life applications.					
5. Pre-requirements for this course (if any):					
Fluid Mechanics: 322-ME-3					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
It's to introduce the main heat transfer topics to mechanical engineering students.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance-learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basic concepts in heat transfer	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Discuss the data obtained through the experiments in heat transfer	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Develop experimental skills in engineering applications in heat transfer	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to heat transfer	3
2.	**Modes of Heat Transfer & Electric Circuits.**	6
3.	**Steady State Conduction.**	8
4.	**Fins & Extended Surfaces**	8
5.	**Unsteady State Conduction**	8
6.	**Free Convection.**	6

7.	**Forced Convection.**	8
8.	**Radiation**	7
9.	**Heat Exchangers**	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%
2.	Midterm Exam 2	15-16	15%
3.	Quizzes and Assignment	2, 8, 15	15%
4.	Lab	Every week	15%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Theodore L. Bergman and Adrienne S. Lavine, "Fundamentals of heat and Mass transfer",WILEY ,8th Ed., 2017 ISBN-9781119337676 ISBN-9781119320425
Supportive References	Yunus A. Cengel and Afshin J. Ghajar, "Engineering/Computer Science Mechanical Engineering)", McGraw-Hill Education, 8th Ed., 2014 ISBN-10: 9814595276 ISBN-13: 978-9814595278
Electronic Materials	Videos by instructor and YouTube courses
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats

Items	Resources
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

2023
TP-153

Course Specification
(Bachelor)

Course Title: Measuring Devices
Course Code: 414-ME-2
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
1L + 1 P = 2					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (7^{th} /4^{th})					
4. Course General Description:					
This course covers and concentrates on the theory, design, and performance, operation principles of the mechanical measuring devices used in the different engineering applications, the correct methods of measurement, the devices calibration, determination of the zero and standard error, and avoiding the common errors in measurement operations.					
5. Pre-requirements for this course (if any)**:**					
321ME-3: Theory of Machines					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
At the end of this course, the students should be able to: **Understand the basic principles of measurement and devices usage.** **Know the different measurement ways in the mechanical engineering field.** **Gain the skills of using the different measuring devices in the mechanical engineering field.** **Gain the accuracy skills in the different measurement operations.**					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define basic concepts of Measurement, Metrology, Error, Uncertainty, Accuracy, and Precision	PLO1.1	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Interpret measurement data sets correctly using statistical concepts, especially during the coverage of errors and uncertainty in measurements	PLO1.3	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.3	Give examples of calculations (directly or indirectly) correctly by hand or by using a computer program	PLO1.4	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.4	Interpret safe and logical lab procedures, develop a proper plan for data gathering from the experiment to attain a stated objective, and account for errors statistically	PLO1.4	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Justify awareness about the principles of measurement	PLO2.1	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise independent learning by assigning and evaluating time-bound assignments/seminars/ discussions by incorporating the recent topics	PLO3.3	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Mechanical Measurements	3
2.	Terminology in Mechanical measurements	6
3.	Accuracy, Precision and Significant Digits	5
4.	Errors in Measurement-Classification of Errors	5
5.	Uncertainty analysis-Numerical Problems	6
6.	Data analysis, presentation, and written report	6
7.	Temperature Measurement	6
8.	Pressure Measurement	6
9.	Measurement of fluid properties, Flow measurement	2
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam 2	12-13	15%
3.	Quizzes	8, 12	10%
4.	Assignment	10-12	20%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1-Mechanical Measurements (2nd Edition) (2015) S.P. Venkateshan John Wiley & Sons LtdThe Atrium, Southern GateChichester, West SussexPO19 8SQ United Kingdom ISBN-10 : 9383656913, ISBN-13 : 978-9383656912 2-Mechanical Measurements (2008) S.P. Venkateshan ISBN-10:1420080784 ISBN-13:978-1420080780
Supportive References	1. Theory and Design for Mechanical Measurements, 7th Edition (2019) Richard S. Figliola and Donald E. Beasley ISBN-13 : 978-1119723455 2. Measurements and their Uncertainties: A practical guide to modern error analysis, Ifan G. Hughes, Thomas Hase, Oxford University Press, ISBN: 9780199566334 (ISBN10: 019956633X) Measurement Uncertainties, S V Gupta, Springer, 2012, ISBN : 978-3-642-20988-8
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers

Items	Resources
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :Machine Design
Course Code: 421-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (8^{th} /4^{th})					
4. Course General Description:					
This course is devoted to study the power transmission systems and analyze the stresses on each machine element in the transmission line. The course also deals with the selection of the right power source to drive such systems and the design of shafts, keys, belts, gears and bearings and all other elements involved with transmission line					
5. Pre-requirements for this course (if any)**:**					
Machine Elements Design-1 411-ME-3					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
1. Describe the concept, procedures, and data for stress analysis. 2. Recognize the machine elements in power transmission systems. 3. Acquire competency in sizing and selecting mechanical components for mechanical systems 3. Co					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	60	100
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
--				
2.0	**Skills**			
2.1	Categorize the machine elements in power transmission systems and acquire competency in sizing and selecting mechanical components for mechanical systems	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Apply the concept, procedures, and data for stress analysis	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.3	Design and select mechanical elements according to codes and standards	**PLO2.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.4	Use failure theories for designing elements made of ductile or brittle materials	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to stress analyses	8
2.	Design of shafts & keys	8
3.	Design of Belts	8
4.	Design of bearings	8
5.	Design of journals	6
6.	Types of transmissions	6
7.	Study the different types gearboxes	8
8.	Design of single reduction gear box	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework1		1%
2.	Quiz1		1.25%
3.	Homework2		1%
...	Quiz2		1.25%
	Homework 3		1%
	Midterm 1		30%
	Homework4		1%
	Quiz3		1.25%
	Homework5		**1%**
	Quiz4		**1.25%**
	Presentation / Project		**20%**
	Final exam		**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1-Machine DesignKhurmi (2005) R.S. & Gupta, J.K. ISBN-10: 8121925371 ISBN-13: 978-8121925372 2-Shigley's Mechanical Engineering Design (2020) Keith J. Nisbett Richard G. Budynas ISBN-10:9390219639 ISBN-13:978-9390219636
Supportive References	1-Fundamentals of Machine Component Design, EMEA Edition (2021) Robert C. Juvinall, Kurt M. Marshek ISBN-10:1119834856 ISBN-13:978-1119834854 2-Mechanical Design of Machine Elements (2023) Özgen Ü. Çolak ISBN-10:975040971X ISBN-13:978-9750409714
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	
Technology equipment (projector, smart board, software)	
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching		
Effectiveness of Studentsassessment		
Quality of learning resources		
The extent to which CLOs have been achieved		
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Thermodynamics-2
Course Code: 422-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (8^{th} / 4^{th})					
4. Course General Description:					
This course covers and concentrates on the theory, design, performance and operation principles of the power and refrigeration systems, including a number of examples and problems to which thermodynamics can be applied, and problems refer to processes that occur in equipment such as steam power plant, vapor compression refrigerator.					
5. Pre-requirements for this course (if any)**:**					
Thermodynamics-1 222-ME-3					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
To enable students to understand, define, design, and analyze different types of refrigeration and power systems.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain and analyze the fuels and combustion processes in thermodynamic systems	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
...				
2.0	**Skills**			
2.1	Outline the power and refrigeration cycles	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Apply the thermodynamics relations generally and for simple compressible substances specifically	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.3	Apply the basics, physical concepts in the practical applications of gas mixtures	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	First and second laws of thermodynamics.	4
2.	Power systems with phase change (Concepts of vapor power cycles and their applications: Rankine cycle for vapor power plants, Reheat cycle, and Regenerative cycle. Lab experiment: Steam turbine).	6
3.	Refrigeration systems with phase change (Concepts of refrigeration cycles and their applications: Refrigerators and heat pumps, vapor-compression refrigeration cycle. Selection of the right refrigerant. Heat pump systems. Lab experiment: Heat pump and Industrial refrigeration system).	6
4.	Power systems with working gaseous fluids (Concepts of gas power cycles and their applications: Otto cycle, Diesel cycle, Brayton cycle, and Jet-propulsion cycles. Lab experiment: Gas turbine and two-stage compressor).	5
5.	Refrigeration systems with working gaseous fluids (The air- standard refrigeration).	6
6.	Thermodynamic relations (Maxwell relations, Gibbs equation, Clapeyron equation, Clapeyron-Clausius equation, General relations for the variation of enthalpy, internal energy and entropy and specific heat, Joule-Thomson Coefficient).	12
7.	Gas mixtures (Composition of a gas mixture. P-v-T behavior of gas mixtures. Thermodynamic properties of gas mixtures).	10
8.	Gas-vapor mixtures and air-conditioning (Dry and atmospheric air-Specific and relative humidity of air-Dew-point and wet-bulb temperatures. The psychrometric chart. Air-conditioning processes. Lab experiment: Cooling tower).	6
9.	Chemical reactions (Fuels and combustion and their applications. Theoretical and actual combustion processes. Enthalpy of formation and enthalpy of combustion. Steady-flow and closed reacting systems. First law analysis of reacting systems. Adiabatic flame temperature)	3
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam 2	11-12	15%
3.	Quizzes/ Assignments/ Project	2, 8, 13	15%
4.	Lab	Every week	15%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Thermodynamics: An Engineering Approach ISE (2023) Yunus A. Cengel Dr. , Michael A. Boles, et al. ISBN-10 :1266152113 ISBN-13 :978-1266152115.
Supportive References	Fundamentals of Engineering Thermodynamics 9th edition (2018) Moran, Michael J. ISBN 10: 1118412931 ISBN 13:9781119721437
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Hydraulic Machines and Fluid Power Systems
Course Code: 423-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (8th /4th)					
4. Course General Description:					
This course provides the student with in-depth explanation of the hydraulic machines (Hydraulic turbines and pumps) and the vast field of fluid power to understand the design, analysis, operation, maintenance, and application of fluid power systems. The student learns how to design, select and connect pumps. for fluid power system, the student understands fluid power systems operation, components, and hydraulic circuits.					
5. Pre-requirements for this course (if any):					
322-ME-3 Fluid Mechanics					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
Upon completing this course, it is expected that the students will be able to: 1. Specify the different types and applications of hydraulic machines. 2. Differentiate between impulse and reaction turbines. 3. Specify the different types and applications of pumps. 4. Evaluate the performance of pumps and turbines by determining hydraulic, volumetric, mechanical, and overall efficiencies. 5. Determine system head losses through a system. 6. Identify how to connect pumps in series and parallel. 7. Specify the basic components of fluid power system, such as pumps, actuator, valves, filters, and reservoirs. 8. Describe the types of hydraulic valves. 9. Describe the construction and design features of hydraulic cylinders. 10. Analyze the operation and performance of hydraulic circuits.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the hydraulic machines according to the fluid energy	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Compare hydraulic machines according to their application	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.3	Describe hydraulic machines (Turbines and Pumps)	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.4	Give examples of engineering problems for hydraulic machines	**PLO1.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.5	Show and measure turbines and pumps' performance at different conditions	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.6	Discuss hydraulic circuits and their components	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Calculate the required pressure and flow rate of a pump for a specific application	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Distinguish hydraulic valves and their use	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.3	Estimate and diagram the pumps' performance	**PLO2.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Hydraulic Machines	4
2.	Pelton Turbines	6
3.	Francis & Kaplan Turbines	8
4.	Centrifugal Pumps	8
5.	Cavitation in Pumps	4
6.	Pumps Connection and selection	4
7.	Introduction to fluid Power systems	4
8.	Hydraulic Pumps(Positive displacement pumps)	4
9.	Hydraulic Valves	7
10.	Hydraulic Cylinders and Tanks	7
11.	Examples of Hydraulic circuits	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	4, 7,10,13	7%
2.	Quizzes	3, 5, 7, 9,11,13	7%
3.	Midterm exam -1	5	15%
4.	Midterm exam -2	11	15%
4.	Project, Reports, Oral Exam	14	10%
5.	Final practical exam	14	6%
6.	Final exam		40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- A Textbook of Fluid Mechanics and Hydraulic Machines (2016) RK Rajput ISBN-10:9789385401374 ISBN-13: 978-9385401374 2-Fluid Power with Applications: Pearson New International Edition (2013) Anthony Esposito ISBN-13: 978-1292023878
Supportive References	- Dixon, S.L., "Fluid Mechanics and Thermodynamics of Turbo-machinery", Butterworth Heinemann, 5th ed., 2005. - Crowe, T.C., et al. "Engineering Fluid Mechanics", 8th ed., 2004. Lewis, R. L., "Turbo-machinery Performance Analysis", Arnold, London, Butterworth-Heinemann, 2001. - Krivchenko, G. I. , "Hydraulic Machines: Turbines and Pumps", Lewis Publishers, 2nd ed., 1994. - Pinches, M. J. & Ashby, J. G., "Power Hydraulics", Prentice Hall, 1988.
Electronic Materials	Lecture notes on blackboard,Videos
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom with 50 seats • Laboratory with 25 seats
Technology equipment (projector, smart board, software)	• Hydraulic Circuits Simulation software • Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

2023
TP-153

Course Specification
(Bachelor)

Course Title: System Dynamics and Mechanical Vibrations
Course Code: 424-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 14 September 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	
3. Level/year at which this course is offered: (8th/4th)					
4. Course General Description:					
System Dynamics and Mechanical Vibrations is a core mechanical engineering subject and a prerequisite for engineering students. This course covers system dynamics' principles and basics. In addition, it covers the modeling and analysis of dynamical mechanical systems.					
5. Pre-requirements for this course (if any):					
321-ME-3 319-MATH- 3					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
Developing course material according to the up-to-date advancements in the field and providing reference material.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define dynamical/vibrational characteristics of mechanical systems, degrees of freedom, and types of vibrations.	**PLO1.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
1.2	Identify the mechanical system's dynamical parameters	**PLO1.3**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.0	**Skills**			
2.1	Develop the principles of dynamics and vibrations of mechanical systems.	**PLO2.1**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Construct mechanical and mathematical models for the dynamic systems.	**PLO2.2**	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to dynamic systems, Modeling of mechanical systems	8
2.	Methods of solving differential equations & Laplace transformations	10
3.	State Space Representation & Transfer Function development of mechanical systems	6
4.	Introduction to Vibrations of single degree of freedom SDOF systems + Free Un-damped/Damped Vibrations Analysis	8
5.	Forced Vibrations for Damped/Un-damped SDOF systems	6
6.	Frequency Response Transfer Function – Bode Plots	6
7.	Vibrations of multi degree of freedom systems	6
8.	Introduction to Continuous Systems	4
9	Vibration Absorption and Isolation	6
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes/ Assignments/ Project	3, 6, 9, 12	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Mechanical Vibrations in SI Units (2017) Singiresu S. Rao. ISBN-13:978-1292178608

	2-Fundamentals of Vibrations (2014) Leonard Meirovitch. ISBN-13:78-1577666912
Supportive References	1-Theory of Vibration With Applications (2018) William T. Thomson ISBN-13:978-0748743803 2-Analysis and Design of Dynamic Systems (1997) Ira Cochin and William Cadwallender ISBN-10:0673982580 ISBN-13:978-0673982582
Electronic Materials	Provided on blackboard
Other Learning Materials	Null

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room / System Dynamics and Mechanical Vibrations Lab
Technology equipment (projector, smart board, software)	Computer lab with systems with Matlab, Simulink software, Festo and other simulation programs
Other equipment (depending on the nature of the specialty)	Vibration testing equipment

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of Studentsassessment		Indirect (through course evaluation survey)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Faculty and Quality Committee	Direct (through Rubrics)
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	Null

DATE	14.09.2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Control Systems
Course Code:	511-ME-3
Program:	Bachelor in Mechanical Engineering
Department:	Mechanical Engineering
College:	College of Engineering
Institution:	King Khalid University, Abha, Saudi Arabia
Version:	10
LastRevision Date:	21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (9^{th} /5^{th})					
4. Course general Description:					
The purpose of the course is to cover the fundamentals concepts of feedback control systems properties, representation, and analysis in time and frequency domain. Strong emphasis is given to demonstrate the theoretical material with examples related to real life. Modeling applications are discussed during the lectures and further illustrated with simulation studies. Practical experiments are conducted in the laboratory. The conventional method of classroom interaction between instructor and student is essential. In addition to that, multimedia teaching aids and animations/videos are used for lecture sessions. The communication between the instructor and the students is regularly maintained using blackboard interface and learning material is also provided through blackboard to the students.					
5. Pre-requirements for this course (if any)**:**					
424-ME-3 System Dynamics & Mechanical Vibrations					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The course objective is to enable the students to understand principles of control systems such as classifications of control systems, characteristic of feedback control systems, modelling of mechanical, electrical, electro-mechanical and hydraulic systems, block diagrams reduction. In addition to that, to analyze the performance of the first and second order systems and stability concepts.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define in-depth integrated body of knowledge and comprehension of the underlying theories, principles, and concepts in automatic control.	**PLO1.1**	**Lectures** **Tutorial** **Sheets**	**Quizzes** **Lab** **Midterm** **Assignment**
...				
2.0	**Skills**			
2.1	Apply integrated theories, principles, and concepts in various contexts related to control systems, professions, or fields of work	**PLO2.1**	**Lectures** **Tutorial** **Sheets**	**Quizzes** **Lab** **Midterm** **Assignment**
3.0	**Values, autonomy, and responsibility**			
3.1	Evaluate and collaborate responsibly and constructively in the practical and experimental work	**PLO3.2**	**Lectures** **Tutorial** **Sheets**	**Quizzes** **Lab** **Midterm** **Assignment**
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to control systems and Laplace transforms.	6
2.	Theory and modeling of linear mechanical systems: lumped parameter models of mechanical, electrical systems and Electromechanical systems; interconnection laws.	8
3.	Actuators and sensors. Linear systems theory: linear algebra	6
4.	Block diagrams	6
5.	Time response, poles and zeros	5
6.	Time response solutions via analytical and numerical techniques	9
7.	Stability and Feedback systems control	4
8.	Stability of control systems: Routh–Hurwitz criterion	6
9.	Controllers	4
10.	PID compensation; steady-state characteristics	6
11.	Root-locus and Frequency domain method	4
12.	Bode plots and Nyquist stability	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes, Project	3, 6, 9,11	10%
4.	Assignment	4, 7, 10,12	7%
5.	Discussion Boards	2, 8 , 14	3%
4.	Lab	Every week+ Final Lab Exam	10%
5.	Final exam		40%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1-Control Systems" 2th ed (2017) A. Anand Kumar. PHI Learning Private Limited, Delhi ISBN: 9788120349391 2- Control Systems Engineering (2022) Norman S. Nise ISBN-10:1119590132 ISBN-13:978-1119590132 3- Automatic Control Systems 9e (WSE) (2009) F Golnaraghi ISBN-10:0470048964 ISBN-13:978-0470048962
Supportive References	Nagoor, K., "Control System Engineering " 2st Ed., Rba Publications, 2013.ISBN: 9780000326065
Electronic Materials	http://en.wikibooks.org/wiki/Control_Systems. Modern Control Systems (10th Edition) By Richard C. Dorf, Robert H. Bishop.
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 25 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of	Student and faculty	Indirect through surveys

Assessment Areas/Issues	Assessor	Assessment Methods
Studentsassessment		
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Senior Design Project
Course Code: 573-ME-4
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(4)					
4					
2. Course type					
A.	☐University	☐College	Department	☐Track	☐Others
B.	●Required			☐Elective	
3. Level/year at which this course is offered:(9-10th /5th)					
4. Course General Description:					
Selecting an application topic that relates to the student's specific discipline. Collecting the required information (theoretical and experimental) for the project. Preparing preliminary experiments or developing the required mathematical and/or computational models. Preparing periodical reports that include an introduction about the project, its objectives, and a description of the experimental, mathematical, and/or computational models. Incorporation of engineering standards and realistic constraints, Analysis and Discussions on the results, and writing a complete final report as per the standard format. Presenting the final phase of the project and defending it in front of an examination committee					
5. Pre-requirements for this course (if any)**:**					
Students should pass 125 credit hours					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The graduation project is a project chosen by the student in the final year (in the ninth level). Students start to collect theoretical and practical information about the subject of the project and design and construct an experimental setup or develop a mathematical model. The second phase consists of performing experimental tests or verifying mathematical models using a computer simulation. Finally, the students prepare a final report, present it, and defend it in front of the Committee of project evaluation.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid ● Traditional classroom ● E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	60
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify and incorporate cost-effectiveness and resource optimization in the implementation of the engineering project	**PLO1.2**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
1.2	Identify, formulate, and find various solution strategies by using appropriate resources	**PLO1.4**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
1.3	State and integrate sustainability principles in the design, development, and execution of engineering projects, ensuring compliance with relevant	**PLO1.4**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	environmental standards and regulations			
2.0	**Skills**			
2.1	Analyze and formulate the problem to find solutions	**PLO2.1**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.2	Design, develop, and test prototypes in accordance with relevant standards, and critically analyze results to refine engineering solutions	**PLO2.2**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.3	Judge and understand contemporary issues involved in the project	**PLO2.3**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.4	Apply techniques, skills, and necessary modern engineering tools for completing the project and justifying or evaluating the errors	**PLO2.4**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.5	Analyze and articulate the impact of engineering decisions on global, economic, and social contexts by integrating ethical and stakeholder needs	**PLO2.5**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.6	Organize the project content	**PLO2.6**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.7	Appraise ideas and project outcomes using graphs, tables, and diagrams, and present and organize the thesis as per the standard format	**PLO2.7**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
2.8	Operate effectively and interact with the audience	**PLO2.7**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the ability to make informed judgments in the design and implementation of engineering solutions	**PLO3.1**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
3.2	Distributing the project work among the team and contributing individually	**PLO3.2**	Lectures Main library Online learning Discussions Self-learning Tutorials Co-Learning	Discussions Oral presentations Technical report
3.3	Research on the internet and digital library to get more	**PLO3.3**	Lectures Main library Online learning	Discussions Oral presentations Technical report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	information, and employ the blackboard facility to communicate with each other and with the instructors		Discussions Self-learning Tutorials Co-Learning	

C. Course Content

No	List of Topics	Contact Hours
1.	**Collecting of required information (theoretical and experimental) for the project**	**10**
2.	**Discussions within team and supervisors and expert committees**	**6**
3.	**Conducting pilot experiments, implementing the mathematical and/or the computational models and doing sample simulations**	**10**
4.	**Understanding the feasibility and procuring/outsourcing required items required for the project**	**6**
5.	**Presenting the first phase of the project in front of an examination committee.**	**6**
6.	Conducting experiments, running, and implementing the mathematical and/or computational models	6
7.	Analysis of the results and writing a complete final report as per the standard format	8
8.	Presenting the project and defending it in front of an examination committee.	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Group Discussion, examination, speech	**5**	**10%**
2.	Internal presentations	**6**	**10%**
3.	Technical report (Interim)	**8**	**10%**
4.	First phase presentation	**11-12**	**10%**
5.	Second Phase internal presentation	6	10%
6.	Poster Presentation	8	10%
7.	Final Report	10	20%
8.	Final presentation		20%
	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	It is indicated according to the specialization field which will be chosen for the project.
Supportive References	It is indicated according to the specialization field which will be chosen for the project.
Electronic Materials	http://engineering.kku.edu.sa/en/content/1204 It is indicated according to the specialization field, which will be chosen for the project.
Other Learning Materials	Microsoft office Programs (Word, Excel and PowerPoint) and other programs Depends on individual project Topics.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratories, Demonstration rooms
Technology equipment (projector, smart board, software)	Projector Software Depending on the individual project Topics.
Other equipment (depending on the nature of the specialty)	It is decided as per the project topic.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Faculty meeting for students Student questionnaires
Effectiveness of Studentsassessment	Faculty and Quality Committee	Revision by another staff member in the same field (peer reviewer) Department council discussions
Quality of learning resources	Student and faculty	Discussing and meeting with students to get feedback about their understanding Periodical meeting of the staff members Monitoring of project activities by senior faculty members Giving the students a model graduation project report. Reviewing the student's reports and showing their mistakes
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

1.2 Course Specifications Of The Specialized ELECTIVE

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title :Internal Combustion Engines
Course Code:531-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	Required		■Elective		
3. Level/year at which this course is offered: (9th and 10th/5th)					
4. Course general Description:					
The course provides the basic knowledge about internal combustion engines. This coursecovers and concentrates on the Gasoline and Diesel engine, principle of operation, workingcycle, the constructional design and functions of the different components. It gives thepractical experience and skills to analyses, diagnose, adjust and IC engine systems.					
5. Pre-requirements for this course (if any)**:**					
413-ME3 Heat Transfer					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
To enable students to understand, define, classify, design, and analyze different types of internal combustion engines.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Discuss the working of an IC engine	**PLO1.1**	**Lectures** **Videos** **Discussion** **Self-learning**	**Final Exam** **Homework** **Midterm Exams** **Lab**
1.2	Distinguish between normal and abnormal combustion	**PLO1.1**	**Lectures** **Discussion** **Self-learning**	**Semester Project** **Lab** **Final Exam** **Homework** **Midterm Exams**
1.3	Describe engine performance parameters	**PLO1.3**	**Lectures** **Discussion** **Self-learning**	**Semester Project** **Lab** **Final Exam** **Homework** **Midterm Exams**
2.0	**Skills**			
2.1	Interpret the basic principles of operation IC engine and related performance parameters	**PLO2.1**	**Lectures** **Discussion** **Self-learning**	**Semester Project** **Lab**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Final Exam **Homework** **Midterm Exams**

C. Course Content

No	List of Topics	Contact Hours
1	Introduction, Engine Types	4
2	Engine Design and Operating Parameters	8
3	Thermal cycles	6
4	Fuel and combustion	8
5	Emission control devices Phenomena	8
6	I.C.E. fuel systems, carburetion, fuel injection	6
7	Ignition systems	8
8	Engine performance	6
9	Supercharging and its effect on engine performance	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes– Mini Projects	2,4,6,8,9	10%
2.	Assignments	1, 4, 5, 6,& 8	10%
3.	Midterm Exam I and II	5-10	30%
4.	Lab	Every week	10%
5.	Final exam		40%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Internal Combustion Engine Fundamentals 2E (MECHANICAL ENGINEERING) (2018) John Heywood ISBN-10:9781260116106 ISBN-13:978-1260116106
Supportive References	Willard W. Pukabek, "Engineering Fundamentals of the Internal Combustion Engines", Prentice Hall, 2nd Edition, 2003. ISBN-13: 978-0131405707 ISBN-10: 0131405705 Lecture Handouts
Electronic Materials	Blackboard, lecture notes and videos
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

Course Specification

(Bachelor)

Course Title:Energy Conversion
Course Code:532-ME-3
Program:Bachelor in Mechanical Engineering
Department:Mechanical Engineering
College:College of Engineering
Institution:King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
3L + 0 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	Required		■Elective		
3. Level/year at which this course is offered:(9^{th} and 10^{th}/5^{th})					
4. Course General Description:					
This course provides students with an understanding of the thermo-physical principles that govern energy conservation processes of different types and will introduce them to modern computational methods of modeling the performance of energy conversion processes, devices and systems. This course is the capstone experience for ME students, synthesizing thermodynamics, fluid dynamics, heat transfer, and computational analysis tools to facilitate engineering design analysis. This course will provide a foundation for design analysis of energy conversion and systems encountered in a variety of applications.					
5. Pre-requirements for this course (if any)**:**					
422-ME-3: Therodynamics-2					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
This course will introduce the student to the basic language and concepts of energy, energy conversion and energy storage. Current and emerging technologies for conversion of thermal, mechanical, chemical, nuclear, solar and electrical energy will be discussed along with an introduction to tools that may be used for comparing competing energy conversion technologies.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Compare competing energy conversion technologies on an economic and efficiency basis	**PLO1.2**	**Lectures Videos Discussion Self-learning**	**Quizzes Final exam Midterm**
1.2	Describe the advantages and limitations of a variety of energy conversion systems	**PLO1.3**	**Class lectures Case studies Problem assignments presentation Reports Group discussion**	**Exams Quizzes Homework Assignments**
2.0	**Skills**			
2.1	Construct multidisciplinary computational performance models of a variety of energy conversion systems	**PLO2.2**	**Class lectures Case studies Problem assignments presentation Reports**	**Exams Quizzes Homework Assignments**
2.2	Perform discussions with colleagues and with teachers to choose and share the	**PLO2.7**	**Class lectures Case studies Problem assignments**	**Exams Quizzes Homework Assignments**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	appropriate ideas.		**presentation** **Reports**	

C. Course Content

No	List of Topics	Contact Hours
1	Energy, Growth Rate & Energy Economics· energy, energy classification, unitsenergy conversion, conversion efficiency· energy information and perspectives· growth rates, peak oil	6
2	Thermal-to-Mechanical Conversion· early engines & efficiency· Thermodynamics & power cycles & efficiency· Rankine Cycle· Brayton Cycle	6
3	Chemical-to-Thermal Conversion· fuels: coal, petroleum, gas· principles of combustion	4
4	Nuclear-to-Thermal Conversion· principles of nuclear energy· pressurized water reactors· boiling water reactors· boiling water, graphite-moderated reactorsGen-IV reactors	6
5	Electromagnetic-to-Electrical Conversion· principles of photovoltaic	6
6	Mechanical-to-Mechanical Conversion· principles of wind energy	5
7	Chemical-to-Electrical Conversion· principles of fuel cells	**6**
8	Introduction to Energy Storage hydrogen· flow batteries· compressed gas, flywheels	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam I and II	5-10	30%
2.	Assignments, Projects, Presentations	2, 5, 8	20%
3.	Quizzes, Take home exams	2, 6, 9	10%
4.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• Energy Conversion, D. Yogi Gaswami& F. Kreith, ed., CRC Press, ISBN 978-1-4200-4431-7 (2008). • Synthetic Fuels, R. F. Probstein and R. E. Hicks, Dover Publications, Inc., ISBN 0-486-44977-7 (2006).
Supportive References	NIL
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee

REFERENCE NO.	
DATE	

2023
TP-153

Course Specification
(Bachelor)

Course Title:Power Plants
Course Code:533-ME-3
Program:Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version:10
LastRevision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered: (9-10th /5th)					
4. Course General Description:					
This course will cover Forms of energy, oil, gas and coal. Combustion processes, energy cycles. Steam generators and their component design, turbines, load curves. Field trips to power plants and other energy installations during laboratory hours.					
5. Pre-requirements for this course (if any)**:**					
413ME-3 (Heat Transfer)					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
The course aims to provide the student with the basic concepts required to understanding and solving the power plants and desalination problems applied on engineering. Defining the main principles of theoretical and practical information for different power plants. Acquiring some skills of designing steam power plants, gas turbine power plants, and combined cycle power plant.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	30
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the main principles of Steam Power plants.	**PLO1.1**	**Lectures Tutorials Lab**	**Quizzes Midterm Assignment**
1.2	List various technological applications of desalination plants and select the appropriate desalination technology.	**PLO1.3**	**-Dialogue and discussion -Small group work -Research activities**	**Semester Class Exam. Homework assignments and reports. Individual and group presentation**
1.3	Compare the different types of power plants and differentiate the most suitable to provide energy and the least polluted environment.	**PLO1.4**	**-Dialogue and discussion -Small group work -Research activities**	**-Individual presentation -Research and reports**
1.4				
2.0	**Skills**			
3.0	**Values, autonomy, and responsibility**			
3.1	Show the work independently and as	**PLO3.2**	**-Solving and**	**-Writing a report and**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	part of a team.		discussing problems in groups. -Teaching using computer applications. -field visits	solving sheet problems. -Discuss and answer the procedure of calculations. -Case study, tables, graphs

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction	4
2.	Ideal and Actual Rankine Cycle (vapor power plant)	10
3.	Alternatives to Improve the Performance on a Rankine Cycle (i.e., Supercritical, Superheat, Reheat, and Regeneration)	8
4.	Ideal and Actual Brayton Cycle (gas-turbine power plant)	8
5.	Alternatives to Improve the Performance on a Brayton Cycle (i.e., Regenerative Gas Turbine, Reheat, and Intercooling)	8
6.	Combined Gas Turbine-Vapor Power Plants	12
7.	Cogeneration Systems and Integrated Gasification Combined-Cycle (IGCC) Power Plant	10
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	11-12	15%
3.	Quizzes and Assignment	2, 8, 13	5%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Homework	3, 6, 12	5%
5.	Semester project	10	15%
6.	Tutorial Sheet	Weekly	5%
7.	Final exam		40%
8.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1. Raja, A.K., "Power Plant Engineering New age International ltd", 2006. 2. Gill, A.B., "Power Plant Performance", ButterworthHeinemann, latest edition. 3. Skrrotiziki, B.G.A &Vopat, W.A., "Power Station Engineering and Economy", Mc-Graw Hill, New York, latest edition. 4. 4. Howe, E.D., "Fundamental of Water Desalination", M. Dekker Publisher, latest edition
Supportive References	
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Computer Aided Manufacturing
Course Code: 534ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered: (9-10th /5th)					
4. Course general Description:					
The first part of the course is devoted to study the fundamentals of automated manufacturing and production systems with numerical control. The course involves the basic concepts of CNC programming milling and turning using G&M codes.					
5. Pre-requirements for this course (if any):					
311-ME-3 Metal Cutting Processes					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
1. Recognize an engineering drawing of a complex part; and how you will be able to correctly program the part. 2. Train on CNC M/C (turning – Milling). 3. Understand the various elements of the robots system. 4. Identify the different type of robots and appreciate the differences between them. Understand the various types of robot geometry available.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance e-learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define various elements of the robot's system.	**PLO1.1**	**Lectures** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
2.0	**Skills**			
2.1	Assess NC part program for the given contour	**PLO2.3**	**Lectures** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
2.2	Interpret robot geometric transformations	**PLO2.3**	**Lectures** **Lab**	**Quizzes** **Lab** **Midterm** **Final**
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the CNC Turning and Milling independently and as part of a team.	**PLO3.2**	**Lectures** **Lab**	**Quizzes** **Lab** **Midterm** **Final**

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to CAM	**2**
2.	Introduction to CNC machines, Introduction to CNC Drilling	**2**
3.	CNC Turning tools	**4**
4.	CNC Turning Programming	**14**

5.	Introduction to CNC Milling machines	8
6.	CNC Milling machines tools	8
7.	CNC Milling Programming	14
8.	Introduction to robot, Robot geometries and problems, Real time problems on Robot geometries, Robot classification, Introduction to Robot Kinematics and problems	8
	Total	**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Project	**6-10-12**	**15**
2.	Midterm-1 & Midterm-2	**7-12**	**30**
3.	Lab and Report	**13**	**15**
4.	Final Exam		**40**
	Total		**100**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Automation, Production Systems, and Computer Integrated Manufacturing (2020) Mikell P. Groover ISBN-10: 0134605462 ISBN-13: 978-0134605463
Supportive References	1-Fundamentals of Computer Integrated Manufacturing (CIM) And Computer-Aided Engineering (CAE) (2023) Dr.Raj kumar.E, Dr.Narendiranath babu.T et al. ISBN-10 :9355451849 ISBN-13 :978-9355451842 2- CAD/CAM: Computer-Aided Design and Manufacturing (2008) M. Groover ISBN-10 :0131101307 ISBN-13 :978-0131101302 3-Introduction to Computer Numerical Control: International Edition (2012) James V. Valentino, Joseph Goldenberg , et al. ISBN-10 :0132794977 ISBN-13 :978-0132794978
Electronic Materials	

Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom Mode: • Classroom with 50 seats • Laboratory with 25 seats E-Learning mode • Laptop/Desktop, internet connectivity Audio-visual system, mic, headphone
Technology equipment (projector, smart board, software)	• Laptop / Computer system Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

2023

TP-153

Course Specification

(Bachelor)

Course Title: Mechanical Behavior of Materials (Elective Course)	
Course Code: 535ME-3	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered:(9^{th}/10^{th})					
4. Course general Description:					
This course involved in studying mechanical behavior of a wide variety of materials ranging from conventional metals and alloys, ceramics and polymers to hybrid materials and biomaterials at different length and time scales. Various contents include elastic deformation; viscoelasticity; yielding, plastic flow, plastic instability, strengthening mechanisms; fracture, fatigue, creep; significance of testing mechanical properties.					
5. Pre-requirements for this course (if any)**:**					
NIL					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
The main aim of this course is to provide knowledge on the application of scientific principles to real-life situations, by using appropriate mechanical tests. The major objectives include: 1. To gain an understanding of the dislocation theory and plastic deformation in order to explain strengthening mechanisms in different materials, materials applications in elevated temperature, fundamental of fracture mechanics, microstructure aspects of fracture toughness, transition temperature, environment-assisted cracking, and fatigue crack propagation. 2. To acquire practical experience in the use of mechanical testing equipment and use of scanning electron microscopy for failure analysis. 3. To cultivate interest in understanding the properties of materials required for various real-life applications.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distancelearning	-	-

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify various strengthening mechanisms and their applications.	PLO1.1	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
1.2	Relate the principles of mathematics, chemistry, and physics in the mechanical behavior of materials and structural design	PLO1.1	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Calculate stress and strain in elastic and plastic deformation.	PLO2.1	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment Final
2.2	Analyze the effect of notches and environments on the material fracture.	PLO2.3	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
2.3	Demonstrate the application of UTM, Impact Testing, Creep Testing, and Fatigue Testing in the characterization of materials	PLO2.3	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
2.4	Show various mechanical testing procedures	PLO2.3	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Engineering Materials	4
2.	Structure and Deformation in Materials	6
3.	Mechanical Testing: Tension Test and Other Basic Tests	4
4.	Stress–Strain Relationships and Behavior	6
5.	Complex and Principal States of Stress and Strain	6
6.	Yielding and Fracture under Combined Stresses	4
7.	Fundamental of fracture mechanics, microstructure aspects of fracture toughness, the transition temperature	4
8.	Environment-assisted cracking, Stress corrosion cracking, hydrogen	4

	embrittlement	
9.	Fatigue of Materials: Introduction and Stress-Based Approach	4
10.	Notch Sensitivity and Fatigue crack propagation	4
11.	Plastic Deformation Behavior and Models for Material, Microstructural Aspects of Plasticity	6
12.	Dislocation, Slips, Strengthening mechanisms	4
13.	Time-Dependent Behavior: Creep and Damping	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%
2.	Midterm Exam 2	15-16	15%
3.	Quizzes/ Assignments/ Project	2, 8, 15	20%
4.	Lab	Every week	10%
5.	Final exam	18	40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• George Ellwood Dieter, Mechanical Metallurgy, McGraw-Hill, 1988 • Marc Meyers and Krishan Chawla (Eds.), Mechanical Behavior of Materials, Cambridge University Press, 2009 • N. E. Dowling. Mechanical Behavior of Materials, 2nd ed. (Prentice Hall: Upper SaddleRiver, NJ) 1999 • T. H. Courtney. Mechanical Behavior of Materials, 2nd ed.

	(McGraw Hill: Boston)2000
Supportive References	Reference books: 1. D. G. Rethwisch and W. D. Callister Jr, Fundamentals of Materials Science andEngineering: An Integrated Approach, John Wiley & Sons, NY, 3rd Edition, 2012. 2. Joachim Roesler, Harald Harders, Martin Baeker, Mechanical Behaviour of Engineering Materials: Metals, Ceramics, Polymers, and Composites, Springer Science & Business Media, 2007 3. ASM Metals Handbook, Volume 11, Failure Analysis and Prevention, Metals Park, 1986. R. W. Hertzberg. Deformation and Fracture Mechanics of Engineering Materials, 4th ed.(J. Wiley & Sons: New York) 1995.
Electronic Materials	Journal of the Mechanical Behavior of Materials
Other Learning Materials	Programs and software related to mechanical testing and characterization

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Material testingLab with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Software depends on individual project Topics
Other equipment (depending on the nature of the specialty)	Testing Samples As per ASTM and testing machines.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Composite Materials	
Course Cod : 536-ME-3	
Program: Bachelor of Science in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
3L					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered: (10th/5th)					
4. Course general Description:					
This course is covers different aspects in composite materials such as classification, applications, processing and fabrication of composites (metal-matrix, ceramic-matrix, reinforced plastics, honeycomb materials, forming structural shapes). Also, Microstructure and mechanical properties of some composite materials will be studied followed by strengthening mechanisms and failure analysis of these types of materials.					
5. Pre-requirements for this course (if any)**:**					
211-ME-3 Materials Science					
6. Co-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					

At the end of this course, the students should be able to:

1. Understand the basic knowledge of classifications and applications of composite materials.
2. Analyze design considerations and laminate structures.
3. Realize processing and fabrication of composites (metal-matrix, ceramic-matrix, reinforced plastics, honeycomb materials, forming structural shapes.
4. Understand Stress-strain characteristics of fiber-reinforced materials.
5. Describe failure theories of fiber-reinforced materials.
6. Analyze environmentally induced stresses in laminates.

2. Teaching mode

(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe basic classifications and applications of composite materials	PLO1.1	Lectures Discussions Demonstration Discussions	Quizzes and Midterms Homework Final Exam
1.2	Summarize Processing and fabrication of composites (metal-matrix, ceramic-matrix, reinforced plastics, honeycomb materials, forming structural shapes	PLO1.1	Lectures Discussions Demonstration Discussions	Quizzes and Midterms Homework Final Exam
1.3	Identify environmentally induced stresses in laminates.	PLO1.4	Demonstration Discussions Lab Manual	Quizzes and Midterms Homework Final Exam
2.0	**Skills**			
2.1	Apply the stress-strain characteristics of fiber-reinforced materials	PLO2.1	Lectures Discussions Demonstration Discussions	Quizzes and Midterms Homework Final Exam
2.2	Apply failure theories of fiber-reinforced	PLO2.1	Lectures Discussions	Quizzes and Midterms

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	materials		Demonstration Discussions	Homework Final Exam
2.3	Analyze Design Considerations and Laminate Structures	PLO2.2	Lectures Discussions Demonstration Discussions	Quizzes and Midterms Homework Final Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate various applications of Composite materials individually and as a group.	PLO3.2		

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to composite materials.	4
2.	Classifications, types and applications of composite materials.	6
3.	Manufacturing techniques of composite materials.	8
4.	Microstructure of composite materials.	6
5.	Mechanical properties of composite materials.	8
6.	Strengthening mechanisms of composite materials.	7
7.	Failure mechanisms of composite materials.	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid-Term exams	7, 11	30%
2.	Quizzes/ Project	2, 3, 5, 6, 8	20%
3.	Assignments	4, 9	10%
4.	Final exam	14	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Composite Materials [electronic resource]: Processing, Applications, Characterizations / edited by Kamal K. Kar. ISBN:9783662495148.
Supportive References	Reference books: 1. Composite Materials, Chung, D.D.L. (2010) , Springer London ISBN: 978-1-4471-2547-1eBook ISBN: 978-1-84882-831-5 DOI: https://doi.org/10.1007/978-1-84882-831-5 2. Composite Materials: Properties as Influenced by Phase Geometry 2005th Edition ISBN-10: 3540243852ISBN-13: 978-3540243854
Electronic Materials	Lecture notes on blackboard,Videos
Other Learning Materials	Nil

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroomwith45 seats
Technology equipment (projector, smart board, software)	• Laptop / Computer system • Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	Nil

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect through surveys
Effectiveness of Studentsassessment	Students	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Faculty	Direct through Examinations
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	Nil
DATE	22.08.2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Energy Efficient Buildings
Course Code: 541-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3L + 0 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		Elective ■		
3. Level/year at which this course is offered: (9-10th /5th)					
4. Course General Description:					
This course deals day lighting, building topology comparison, energy efficient buildings and the role they play in our efforts to address climate change, the optimum cost of energy consumption and building envelope design, the energy consumption in refrigeration, air- conditioning and lighting processes, thermal loads and corrects the power factor, the economic loading and operation for generation units, energy saving policies and use high economic equipment's and improve heat transfer processes, and zero energy homes in hot arid regions, life- cycle considerations and energy efficiency analysis to managing energy demand through equipment selection.					
5. Pre-requirements for this course (if any):					
413ME-3 Heat Transfer					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
Upon completing this course, it is expected that the students will be able to: (i) Estimate the optimum cost of energy consumption. (ii) Monitoring the energy consumption. (iii) Saving energy in refrigeration, air- conditioning and lighting processes. (v) Prediction of thermal loads and correct the power factor. (vi) Estimate the economic loading and operation for generation units. (vii) Use energy saving policies and use high economic equipment's and improve heat transfer processes.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the fundamentals of energy efficiency in buildings.	**PLO1.1**	**Lectures Videos Discussion Self-learning**	**Quiz Homework Midterm Exams Final Exam Semester Project**
1.2	Identify energy-saving opportunities based on a cost-benefit analysis.	**PLO1.2**	**Lectures Videos Discussion Self-learning**	**Quiz Homework Midterm Exams Final Exam Semester Project**
1.3	Discuss the contribution of the building envelope to the energy system.	**PLO1.1**	**Lectures Videos Discussion Self-learning**	**Quiz Homework Midterm Exams Final Exam Semester Project**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	Identify the impact of maintenance measures on savings related to the systems required to heat, cool, and electrically energize various features in a building.	**PLO1.3**	**Lectures** **Videos** **Discussion** **Self-learning**	**Quiz** **Homework** **Midterm Exams** **Final Exam** **Semester Project**
2.0	**Skills**			
...				
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Day lighting, building topology comparison.	3
2.	Energy efficient buildings and the role they play in our efforts to address climate change.	6
3.	The optimum cost of energy consumption and building envelope design.	6
4.	The energy consumption in refrigeration, air- conditioning and lighting processes.	3
5.	Refrigeration systems with working gaseous fluids (The air- standard refrigeration).	6
6.	Thermal loads and corrects the power factor.	6
7.	The economic loading and operation for generation units.	5
8.	Energy saving policies and use high economic equipment's and improve heat transfer processes	3
9.	Chemical reactions (Fuels and combustion and their applications. Theoretical and actual combustion processes. Enthalpy of formation and enthalpy of combustion. Steady-flow and closed reacting systems. First law analysis of reacting systems. Adiabatic flame temperature)	4
10.	Zero energy homes in hot arid regions, life- cycle considerations and energy efficiency analysis to managing energy demand through equipment selection.	3

Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes/ Project	5, 8	10%
4.	Assignment	9,10	20%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1-. Heating, cooling, lighting. Lechner N New York: John Wiley & Sons; 2000, ISBN: 978-1-118-58242-8 2-Building Services Design for Energy Efficient Buildings Paul Tymkow, Savvas Tassou, Maria Kolokotroni et al. ISBN-13:978-0815365617
Supportive References	
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title: Desalination	
Course Code: 542-ME-3	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3L + 0 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		Elective■		
3. Level/year at which this course is offered: (9-10th /5th)					
4. Course general Description:					
This course aims to define the different types of desalination processes. The multistage flash systems, Multi effect and Reverse Osmosis are the most important desalination processes and will be studied in detail. The analysis of desalination plants will be illustrated.					
5. Pre-requirements for this course (if any)**:**					
422-ME-3 Thermodynamics – 2					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
• To provide students with the basic principles required for understanding differentdesalination methods **• To provide students with insight into the nature of desalination.** **• To helpstudents understanding fouling, scaling, and pretreatment** **• To help students develop the ability to calculate permeates flow rate of RO systems** **• and the total productivity of the other systems.**					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the basics, theory, and physical concepts of water treatments.	PLO1.1	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments
1.2	List the different configurations of thermal desalination Plants.	PLO1.1	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments
1.3	Identify the different types of desalination plants.	PLO1.1	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting)	Exams. Quizzes. Homework Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			Problem assignments and Students' presentations. Reports. Group discussion	
1.4	State the Difference between the different desalination plants.	PLO1.1	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments
1.5	Discuss the cost analysis of cubic meters of desalinated water.	KLO1.2	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments
2.0	**Skills**			
2.1	Design different components of the desalination plants.	PLO2.2	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments
2.2	Perform discussions with colleagues and	PLO2.7	Class lectures. Tutorial sessions Case study (data	Exams. Quizzes. Homework

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	the teacher.		collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	Co-operate in a team to experiment with desalination	PLO3.2	Class lectures. Tutorial sessions Case study (data collection, Internet search, and reporting) Problem assignments and Students' presentations. Reports. Group discussion	Exams. Quizzes. Homework Assignments

C. Course Content

No	List of Topics	Contact Hours
1.	Concepts in thermodynamics; Water treatments; Fouling andscaling on tubes; fouling removal	9
2.	Thermal desalination: Multistage evaporation systems (MES); Multistage Flash systems (MSF); Vapor compression desalination, systems(VCD); Solar desalination systems; co-generation power systems.	12
3.	Reverse osmosis systems: Types of membranes; membrane arrangements; Energy recovery; back washing; membrane fouling; Ultra and nano-filtration.	12
4.	Project: Analysis of Desalination Plant	12
5.		
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	5-6	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes	5, 10	10%
4.	Assignment, Projects, Presentations	7,11	20%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	El-Dessouky, H.T. and Ettouney, H.M., "Fundamentals of Salt Water Desalination", Elsevier Science, 2002, ISBN 978-0-444-50810-2
Supportive References	1. Reverse Osmosis; A Practical Guide for Industrial Users - by Wes Byrne 1st Edition 2. Handbook of Desalination and Water Purification – Arshad Hasan Khan and Noam Lior by Elsevier 3. Hisham T. El-Dessouky and Hisham M. Ettouney, Fundamentals of Salt WaterDesalination, Elsevier Science B.V., 1st , 2002 4. Desalination Processes and Multistage Flash Distillation Practice 1986 Khan A.K
Electronic Materials	http://onlinebooks.library.upenn.edu/webbin/book/lookupid?key=olbp33597
Other Learning Materials	www. Elsevier.com/Desalination

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Refrigeration and Air Conditioning
Course Code: 543-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 10
Last Revision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered:(9-10th/5th)					
4. Course General Description:					
This course addresses the methods of refrigeration-refrigeration cycles: Vapor compression refrigeration cycle absorption refrigeration cycle-refrigerants, evaporators, condensers, compressors, expansion devices, Air conditioning: basics, human comfort, properties of air water vapor mixture, psychrometric processes, psychrometric cycles, psychrometrics.					
5. Pre-requirements for this course (if any)**:**					
Heat Transfer 413-ME-3					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					

At the end of this course, the students should be able to:

- **Predict the COP of refrigerators and heat pumps,**
- **Design of evaporators,**
- **Design of condensers,**
- **Select and sizing expansion devices,**
- **Estimating the cooling load, and**
- **Estimating the air-conditioning load.**

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Identify various thermodynamic processes, materials, and conventions to design and illustrate different refrigeration systems, considering environmental, safety, and economic feasibility.	**PLO1.1**	Lectures, videos and numerical problems	Class work - home work, Midterm exams
1.2	Express knowledge of human comfort and adapt psychrometry processes and charts to solve various practical numerical problems and problems on an estimation of the cooling and heating load, with an introduction to formulation and design of air-conditioning systems to meet the specified needs.	**PLO1.4**	Lectures and numerical problems	Classwork, homework, and final exams.
2.0	Skills			
2.1	Apply and comprehend thermodynamics and heat transfer theories, principles, and concepts in refrigeration and air-conditioning systems.	**PLO2.1**	Lectures and numerical problems	Classwork, homework, and final exams.
2.2	Demonstrate a practical awareness of the working and	**PLO2.3**	Lectures and numerical problems	Classwork, homework, and final exams.

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	operational procedures of various compressors, evaporators, condensers, expansion valves, and different refrigeration and air-conditioning system accessories through appropriate experimentation.			
3.0	Values, autonomy, and responsibility			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Unit I: **Introduction:** Principles of refrigeration-- Carnot refrigeration cycle -- unit of refrigeration – – Unit of Refrigeration-capacity of refrigeration -- coefficient of performance-Heat engine-refrigerating machine-heat pump.	2
2.	Unit II:**Refrigeration systems:** Vapour Compression System – theoretical and practical cycles – system components – compressors – condensers – expansion devices – evaporators – refrigerants. Air refrigeration cycle, Vapour absorption and adsorption refrigeration system- Thermoelectric refrigeration system- Magnetic – Vortex and Pulse tube refrigeration systems.	8
3.	Unit III: **Refrigerants:** Desirable properties – Classification – Nomenclature –Testing for leakage-Environmental effects- ODP & GWP.	5
4.	Unit IV: **Psychrometry:** Psychrometric processes – determination of condition of air entering conditioned space. Air conditioning systems – summer, winter and year-round-year air conditioning systems -- central and unitary systems.	5
5.	Unit V: **Human Comfort:** Requirement of air conditioning – human comfort –comfort chart and limitations – effective temperature – factors governing effective temperature – design considerations.	3
6.	Unit VI: **Cooling and Heating load calculations:** Various heat sources contributing heat load – solar load -- equipment load -- infiltration air load -- duct heat gain -- fan load -- moisture gain through permeable walls and fresh air load,Introduction to design of air conditioning systems.	4
7.	Unit VII: **Recent topics of interest:** Recent topics over and above the syllabus	3
8	Refrigeration and Airconditioning Laboratory Classes	30

Total	60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments/Mini project	3, 5	5%
2.	Quizzes and Homework	3 to 13	15%
3.	Mid Examination	9	30 %
6.	Laboratory	Weekly	10%
7.	Final exam		40 %
13.	Total	--	100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1-Heating, Ventilating, and Air Conditioning: Analysis and Design (2023) Faye C. McQuiston, Jerald D. Parker, et al.“Heating Ventilation & Air Conditioning ISBN-10:111989414X ISBN-13:978-1119894148 2-Refrigeration & Air Conditioning Technology (Mindtap Course List) (2020) Eugene Silberstein, Jason Obrzut, John Tomczyk et al. SBN-10:0357122275 ISBN-13:978-0357122273
Supportive References	- Principles of Heating, Ventilating, and Air Conditioning: A Textbook With Design Data Based on the 2001 Ashrae Handbook-Fundamentals, Jr. Sauer, Harry J. , Ronald H. Howell, William J. Coad, ISBN-13: 978-1883413941 - Basic Refrigeration and Air conditioning by Ananthanarayana, 2013, ISBN-13 978-1259062704 ASHRAE Hand book, Fundamentals, 2021 - Jones W.P., “Air conditioning engineering”, 5th edition,Elsevier Butterworth-Heinemann, 2001
Electronic Materials	WoS Indexed Journals in the field
Other Learning Materials	Blackboard Collaborate Ultra

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	**20-08-2023**

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: **Fundamentals of Heat treatments**
Course Code: **544-ME-3**
Program: **Bachelor in Mechanical Engineering**
Department: **Mechanical Engineering**
College: **College of Engineering**
Institution: **King Khalid University, Abha, Saudi Arabia**
Version: 10
LastRevision Date: 21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered:(9-10th/5th)					
4. Course General Description:					
The principles of heat treatment, natural of metals and alloys, heat treatment processes for steels, hardenability and how to measure it, factors influencing hardenability different quenching media and their influence on properties of metals and alloys, different types of chemical heat treatment, different types of surface hardening, thermo-mechanical treatment for ferrous and non-ferrous alloys, classification of heat treatment furnaces					
5. Pre-requirements for this course (if any):					
211-ME-3 Materials Science					
6. Pre-requirements for this course (if any):					
Nil					
7. Course Main Objective(s):					

Upon completing this course, it is expected that the students will be able to: 1. What is the main purpose for this course?
At the end of this course, the students should be able to:

1. Discuss the nature of metals and alloys.
2. Recite the principles of heat treatment of steels.
3. Explain the heat treatment processes for steels.
4. Assess the hardenability of metals and alloys.
5. Select the quenching media for each heat treatment cycle.
6. Explain the chemical heat treatment of steels.
7. Explain the proper heat treatment cycle for each metal and alloy.
8. Explain the surface hardening treatment for metals and alloys.
9. Explain the thermo-mechanical treatment for ferrous and non-ferrous alloys.
10. Discuss the different types of heat treatment furnaces used in treating metals and alloys.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the nature of metals and alloys for heat treatment	PLO1.1	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
1.2	Explain the hardenability of metals and alloys, and identify the chemical heat treatment of steels	PLO1.1	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment Final
2.0	**Skills**			
2.1	Analyze the proper heat treatment cycle	PLO2.1	Lectures Tutorials	Quizzes Lab

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	for each metal and alloy.		Lab	Midterm Assignment
2.2	Compare the thermo-mechanical treatment for ferrous and non-ferrous alloys	PLO2.3	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
2.3	Interpret the theoretical facts and the experimental results	PLO2.3	Lectures Tutorials Lab	Quizzes Lab Midterm Assignment
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to heat treatment	5
2.	Natural of metals and alloys	4
3.	Principals of heat treatment of steels	10
4.	Heat treatment processes for steels	10
5.	Hardenability and quenching	8
6.	Chemical heat treatment of steels.	8
7.	Surface hardening	5
8.	Thermo-mechanical treatment	5
9.	Heat treatment furnaces and atmospheres	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Midterm Exam 2	11-12	15%
3.	Quizzes/ Project	2, 8, 13	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	T.V. Raja, C.P. Sharma, and A. Sharma, Heat treatment: principles and techniques, PHI Learning Private, New Delhi, 2011 (or later).
Supportive References	1. R.C. Sharma, Principles of heat treatment of steels, New age international (P) Limited, New Delhi, 2003, ISBN: 8122408699. 2. B. Zakharov, Heat treatment of metals, USSR, 2002.
Electronic Materials	Videos by instructor & **Websites on the internet that are relevant to the topics of the course, ex scienceDirect.com.**
Other Learning Materials	**Multimedia associated with the text book and the revel lent websites**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 30 seats System dynamic Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	**calculators**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Finite Element Analysis in Mechanical Design	
Course Code: 545-ME-3	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
1L + 2 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered: (9-10th/5th					

4. Course General Description:

This course is to teach the students about the basics of the Finite Element Method, a numerical tool used for solving different classes of problems engineering. After introducing the theoretical background of the Finite Element Method, students will be apprised to design, mathematically formulate, find solution and do the analysis on solution to various engineering problems.

5. Pre-requirements for this course (if any):

Numerical Methods 419-MATH-3
Machine Design 421-ME-3

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

Upon completing this course, it is expected that the students will be able to:

- Describe the procedures of FEM to solve an engineering problem
- Apply the FEM to 1D – Structural, thermal and fluid problems
- Analyze Plane truss problems, using FEA software and manually.
- Formulate axisymmetric and dynamic problems

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2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	15
2.	**Laboratory/Studio**	60
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the basics of the Finite Element Method	PLO1.1	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.0	**Skills**			
2.1	Formulate the given problem into finite element models	PLO2.2	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
2.2	Apply the mathematical tools to arrive at a finite element formulation	PLO2.1	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
2.3	Apply FEA to solve structural, thermal, and fluid flow problems	PLO 2.1	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction and Basic Concepts of FEA , Matrix Algebra	10
2.	Analysis of trusses-Two dimensional truss element, Stresses, Strains and temperature changes.	9
3.	Beam bending- Two node beam element, Calculation of stresses in beams.	8
4.	Shape functions, Linear and non-linear 1-D elements	10
5.	Two dimensional boundary value problems using triangular elements, Triangular element for general 2D BVP	14
6.	Iso-parametric quadrilateral elements-Shape functions for rectangular elements, quadrilateral elements, Numerical integration for quadrilateral elements, Four node quadrilateral element for 2D BVP	8
7.	Axisymmetric elasticity problems-Governing equations for axisymmetric elasticity, Axisymmetric linear triangular element..	8
8.	Numerical integration for Quadrilateral elements and Triangular elements	8
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	11-12	15%
3.	Quizzes/ Assignments/ Project	2, 6, 10,14	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Finite Element Analysis: Theory and Application with ANSYS 5th (2020) Edition, Pearson; 5th edition ISBN-10 : 0135212103
Supportive References	An Introduction to Finite Element Method, J N Reddy, McGraw - Hill. (2019) ISBN: 9781259861901
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title: Nanotechnology:	
Course Code: 546-ME-3	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(3)					
3L + 0 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		Elective■		
3. Level/year at which this course is offered: (9-10th /5th)					
4. Course General Description:					
The course will introduce students to micro and nano-fabrication techniques. The course will also focus on the type of materials used in such device fabrication. Also, an introduction to Integrated Circuits (IC) fabrication, including Photolithography, Plasma Etching, Thin Film deposition (PVD, CVD, Oxidation, Epitaxy), Wet Processing (silicon etching, metal etches), Surface Micromachining of silicon, and LIGA and UV LIGA (Thick resist lithography, electroplating, molding). The course will also give a basic knowledge about characterization techniques used to characterize micro and nano-structures.					
5. Pre-requirements for this course (if any):					
211ME-3 Materials Science					
6. Pre-requirements for this course (if any):					
NIL					
7. Course Main Objective(s):					
This course aims to introduce students to micro and nano fabrication techniques, especially focusing on integrated circuits (IC), including photolithography, etching, LIGA, and other microscopic fabrications.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the principles of nanotechnology	PLO1.1	**Lectures** **Discussion** **Self-learning**	**Quizzes** **Midterm** **Assignment** **Final**
1.2	Identify various production techniques for nanostructures and their applications	PLO1.1	**Lectures** **Discussion** **Self-learning**	**Quizzes** **Midterm** **Assignment** **Final**
1.3	List different types of nanomaterials and compare them based on their properties	PLO1.1	**Lectures** **Discussion** **Self-learning**	**Quizzes** **Midterm** **Assignment** **Final**
2.0	**Skills**			
2.1	Apply the concept of surface energy and chemical potential, and analyze electrostatic stabilization	PLO2.1	**Lectures** **Discussion** **Self-learning**	**Quizzes** **Midterm** **Assignment** **Final**
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Emergence and challenges of Nanotechnology	6
2.	Physical Chemistry of solid surfaces	7
3.	Development and application of Nano particles, nano wires, nano rods and thin films	7
4.	Special Nano materials: carbon fullerenes and nanotubes, micro and mesoporous materials	6
5.	Nano structures fabricated by Physical Techniques	6
6.	Structural and Chemical Characterization and properties of nano materials (Use of XRD, SEM, TEM, AFM)	6
7.	Application of Nano materials	8
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6-7	15%
2.	Midterm Exam 2	12-13	15%
3.	Quizzes	8, 13	10%
4.	Assignments/ Project	12-13	20%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Marc J. Madou, Fundamentals of Microfabrication: The Science of Miniaturization, Second Edition, CRC Press, 2018, ISBN: 1482274000, 9781482274004 2- Stephen A. Campbell, "The Science and Engineering of Microelectronic Fabrication (Oxford series in electrical and computer

	engineering) Edition-2, Oxford University Press, 2001, ISBN: 0195136055, 9780195136050
Supportive References	1- Julian Serda, Michael Quirk, " Semiconductor Manufacturing Technology, International Edition", Pearson Education, Limited, 2000, ISBN: 0131229370, 9780131229372 2- Hans H. Gatzen, Volker Saile, Jürg Leuthold, "Micro and Nano Fabrication: Tools and Processes", Springer, 2015, ISBN:3662443953, 9783662443958
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

2023

TP-153

Course Specification

(Bachelor)

1.3 Course Specifications for College Electives

(Level 8)

Course Specification

(Bachelor)

Course Title: Knowledge Management	
Course Code: 321-GE-2	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version:1	
Last Revision Date:21 June 2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2L					
2. Course type					
A.	☐University	■College	☐Department	☐Track	☐Others
B.	☐Required		■Elective		
3. Level/year at which this course is offered: (8th/4th)					
4. Course general Description:					
Knowledge management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organization. The main objectives are to analyze the role of knowledge management in attainment of financial objectives, quality and process improvement, and innovation; to apply knowledge management models and technologies to business situations; to use a knowledge management system for an organization and to create a knowledge management plan to leverage opportunities to create, capture, represent and share knowledge within an organization.					
5. Pre-requirements for this course (if any):					
-					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
The main objectives are to analyze the knowledge Management in attainment of financial objectives, quality and process improvement and innovation, to apply knowledge management models and technologies to business situations; to use a knowledge management system for an organization and to create a knowledge management plan to leverage opportunities to create, capture, represent and share knowledge within an organization					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe knowledge about the Formulation of a framework for thinking about knowledge-intensive organizations and describe and work with intangibles.	**PLO1.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
1.2	Identify complex theories and practice of knowledge and intellectual capital management to a wide range of scenarios	**PLO1.2**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
...				
2.0	**Skills**			
2.1	Summarize the aspects of industrial management that may be inappropriate for knowledge-intensive organizations and provide alternatives	**PLO2.6**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.2	Evaluate the action plans for knowledge intensive organizations	**PLO2.6**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Final
2.3				
3.0	**Values, autonomy, and responsibility**			
3.1	Appraise knowledge with multidisciplinary teams	**PLO3.2**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Knowledge Management, KM Models,	3
2.	Knowledge Capture and Codification, Knowledge-Sharing and Communities practice	5
3.	Value of Knowledge management, Role of Organization Culture, Organization Learning and Memory	5
4.	Technologies for knowledge Management, Innovation and Leadership, Life cycle for the knowledge management systems,	5
5.	knowledge Engineering, knowledge acquisition	6
6.	Knowledge Modelling, Decision Support System	6
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%
2.	Midterm Exam 2	15-16	15%
3.	Quizzes, and Assignment	2, 8, 15	30%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Final exam	16-17	40%
5.	Total		100%
6.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	**1- Knowledge Management in Organizations: A critical introduction (2018)** Donald Hislop, Rachelle Bosua, Remko Helms ISBN-10:**0198724012** ISBN-13: **978-0198724018** 2- **Knowledge Management: Value Creation Through Organizational Learning (Springer Texts in Business and Economics) (2025)** Klaus North, Gita Kumta ISBN-10:**3031876490** ISBN-13: **978-3031876493**
Supportive References	
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Design Thinking
Course Code : 322-GE-2
Program: Bachelor of Science Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version: 1
Last Revision Date: 30 Dec 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2L + 0 P = 2					
2. Course type					
A.	☐University	■College	☐Department	☐Track	☐Others
B.	☐Required		Elective■		
3. Level/year at which this course is offered: (8th /4th)					
4. Course general Description:					
Design thinking is a powerful approach to problem-solving that is highly relevant to engineering. It equips students with an understanding of the iterative process (Empathize, Define, Ideate, Prototype, Test) and how it can be applied to engineering challenges. This course will encourage students to translate design concepts into market-ready solutions, focusing on scalability, feasibility, and business impact and help the students learn a series of design thinking concepts, methods and techniques that are used to bring innovation in the business and in the social sector.					
5. Pre-requirements for this course (if any):					
NA					
6. Pre-requirements for this course (if any):					
NA					
7. Course Main Objective(s):					
Upon completion of this course, it is expected that the students will be able to: 1. Identify the design principles to guide ideation 2. Apply creativity, brainstorming, and concept generation process in designing needs solutions. 3. Develop prototypes by analyzing the feasibility and effectiveness of solutions 4. Analyze innovation management strategies					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the design principles to guide ideation	**PLO1.1**	Lectures Videos Discussion Self-learning	Midterm Assignment Quizzes Final Exam
1.2	Show creativity, brainstorming, and the concept generation process to design effective solutions.	**PLO1.4**	Lectures Videos Discussion Self-learning	Midterm Assignment Quizzes Final Exam
2.0	**Skills**			
2.1	Develop prototypes by analyzing the feasibility and effectiveness of solutions	**PLO2.2**	Lectures Videos Discussion Self-learning	Midterm Assignment Quizzes Final Exam
2.2				
3.0	**Values, autonomy, and responsibility**			
3.1	Analyze innovation management strategies	**PLO3.2**	Lectures Videos Discussion Self-learning	Midterm Quizzes Assignment Final Exam
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Understanding Design Thinking	6
2.	Tools for Design Thinking	6
3	Immersion and Ideation	6
4	Analysis and Synthesis	4
5	Prototyping and Testing	4
6	Business Innovation case studies and activities	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments + Quizzes+ Presentations	4, 7, 9, 11	30%
2.	Midterm-1& Midterm-2	6-12	30%
3.	Final Exam	15	40%
	Total		**100%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd., 2009 • IdrisMootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, 2013 • Den Dekker T. Design thinking. Routledge; 2020.
Supportive References	• Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve– Apply", Springer, 2011
Electronic Materials	Lecture Handouts
Other Learning Materials	Lecture notes and videos

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with seating capacity of 50 sseats E-Learning mode Laptop/Desktop, internet connectivity Audio-visual system, mic, headphone
Technology equipment (projector, smart board, software)	Laptop / Computer system Multimedia teaching aids – LCD Projector speakers
Other equipment (depending on the nature of the specialty)	**NA**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect through surveys
Effectiveness of Students' assessment	Faculty and Quality Committee	Direct through Rubrics
Quality of learning resources	Students and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Faculty and Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :**System Dynamics**
Course Code: **323-GE-2**
Program:**Bachelor in Mechanical Engineering**
Department:**Mechanical Engineering**
College:**College of Engineering**
Institution:**King Khalid University, Abha, Saudi Arabia**
Version::**V10**
LastRevision Date:**21 June 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)	
2L	
2. Course type	

A.	☐University	☐College	■Department	☐Track	☐Others
B.	☐Required		■Elective		

3. Level/year at which this course is offered: (8th /4th)

4. Course General Description:

This course deals with the methods and modern techniques of engineering management analysis for Formulation, decision making, Strategy Analysis, and Implementation, Leadership and Management of Technical People and Team Building, Financial Analysis.

5. Pre-requirements for this course (if any):

NIL

6. Pre-requirements for this course (if any):

NIL

7. Course Main Objective(s):

The overall aim of this course is to apply the system dynamics approach to model and simulate real-world processes/systems in both the public and private sectors. Emphasis is on designing simulation models to explain and improve the problematic dynamic behavior. Students learn to use the system dynamics modelling process: define the dynamics of problems, develop hypotheses for problematic dynamic behavior, analyze and validate computer simulation models, and design policies to improve systemic behavior.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understanding in detail the system dynamics modelling process.	**PLO1.1**	Lectures, class discussion, Power point presentation	Class work - home work, and final exams.
1.2	Identify and evaluate potential leverage points for improving model behavior through policy parameter analysis;	**PLO1.1**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
1.3	Clarify hypotheses (in words, diagrams, and a set of model equations) as tentative explanations of problematic dynamic behavior	**PLO1.1**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
1.4	Define a model's structure to discover the endogenous source of particular dynamic patterns;	**PLO1.3**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
1.5	Identify and test a model to improve its reliability and usefulness	**PLO1.3**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Test a model's sensitivity to parameter assumptions	**PLO2.3**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
2.2	Conduct policy design and evaluation with modifications in the structure of an explanatory model;	**PLO2.3**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
2.3	Develop and analyze a simulation model that provides a useful explanation of a given problematic behavior in a narrowly defined task	**PLO2.3**	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
3.0	**Values, autonomy, and responsibility**			
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Systems thinking	2
2.	Causal loop diagrams	2
3.	Dynamics of stocks, flows, growth	4
4.	Modeling delays	2
5.	Model validation and decision making	2
6.	Modeling Human Behavior and nonlinear relationships	6
7.	Modeling Supply Chains	6
8.	Timing & Integration	2
9.	Control Theory	2
10.	Applications & Cases	2
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Seminars and Case Studies		30 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Mid-Term Tests (Not less than two Exams)	5, 11	30 %
12.	Final Exam		40%
13.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1. Sterman, John D. Business dynamics: systems thinking and modeling for a complex world. Irwin, 2014. 2. Forrester, jay W. Industrial dynamics. Mansfield Centre, Conn. Martino Publ. 2013 3. Kelton, W. David, et al. Simulation with Arena. Mc Graw-Hill, 2015.
Supportive References	1. Senge, Peter M. The fifth discipline: the art and practice of the learning organization. Doubleday, 1990. 2. Richardson, George P., and Alexander L. Pugh. Introduction to system dynamics modeling with DYNAMO. Productivity Press, 1992. 3. Wolstenholme, Eric F., and Jay W. Forrester. System enquiry: a system dynamics approach. John Wiley and Sons, 1994.
Electronic Materials	Videos
Other Learning Materials	Blackboard Collaborate Ultra

3. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Three classrooms equipped with 50 seats and 50 drawing tables.
Technology equipment (projector, smart board, software)	Data show and multimedia
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

Course Title :Materials Science
Course Code:211-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering

College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version:10
Last Revision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (3rd /2nd)					
4. Course general Description:					
Material science is a core mechanical engineering subject and a prerequisite for engineering student. This course give student the fundamental information about what are inside the material by this wat student can understand different processing of materials such as mechanical testing and also deformation of materials. The conventional method of classroom interaction between the teacher and student is essential for teaching this subject. At the same time, practical experiments are conducted. All these methods are being followed and any improvement in the implementation shall be made as per the feedback of students. The communication between the teacher and student is regularly maintained and learning material is also provided through blackboard to the students.					
5. Pre-requirements for this course (if any):					
129-PHYS-4 Physics-1 107-CHEM-4 General Chemistry					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
This course covers and concentrates on principles of material science such as atomic structure and interatomic bounding, crystal structure of materials, theory of diffusion, imperfections in crystals, mechanical testing and evolution of materials, phase diagram and cooling curves of metals and alloys, iron-carbide diagram for steel and cast iron.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
6.	**Lectures**	30
7.	**Laboratory/Studio**	30
8.	**Field**	
9.	**Tutorial**	
10.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Select theories of diffusion and explain the imperfection of crystals	**KLO1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
1.2	Classify different types of materials types based on their properties	**KLO1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
...				
2.0	**Skills**			
2.1	Analyze the phases and distinguish invariant reactions of phase diagrams	**KLO2**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.2	Assess the structure of metals on a macro/micro scale	**KLO3**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
...				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
4.	Introduction	4
5.	Atomic bond	6
3.	Crystal structure	8
4.	Crystals imperfection	6
5.	Atomic diffusion	6
6.	Mechanical properties and behavior	14
7.	Phase diagram Iron-iron carbide diagram	10
8.	Corrosion	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Midterm Exam 1	5-6	15%
5.	Midterm Exam 2	11-12	15%
6.	Quizzes and Assignments	2, 8, 13	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	William D. Callister Jr., David G. Rethwisch, " Materials Science and Engineering", Wiley 10th Edition (2020) ISBN-10: 1119721776 ISBN-13: 978-1119721772
Supportive References	V. Raghavan, Materials Science and Engineering: A First Course 6th Edition, Kindle Edition, PHI Learning (2015) ISBN-13: 978-8120324558 ISBN-10: 8120324552
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	

DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

2 Course Specifications Of Basic Science Courses

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: General Chemistry	
Course Code: 107 CHEM-4	
Program: Bachelor Degree in Engineering	
Department: Joint Program/ Science	
College: Science	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 7	
Last Revision Date: 26-03-2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3+1)					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (Level1 / First Year)					
4. Course general Description:					
General Chemistry (107Chem-6) is a general introduction to chemistry course that incorporates both lectures and laboratory experiments in developing and understanding chemical concepts and practices.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					

This course aims to

- Introduce students the basic knowledge and principle in general chemistry.
- The course mainly emphases on matters, its properties and measurements, Atoms and the Atomic Theory, Mass Relations in Chemistry, Electronic Structure of Atoms, molecular geometry.
- Properties of solid, liquid and gases
- Developing the student's special abilities in chemistry.

Help students to acquire the skill in chemistry using laboratory.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To demonstrate the matters and measurement	K1 and K2	Each lecture emphasis the concept to be covered and the details of this concept.	Mid-term exams, final exam, homework, quizzes and discussions.
1.2	Recognize the fundamental principles and concepts of atom, molecule and ions and applications related to this course.	K1 and K2	Lectures. Discussions in lectures and try to engage students	Mid-term exams, final exam, homework, quizzes and discussions
1.3	Summarize the trends and patterns in the context of the periodic table.	K1	Lectures. Many problems to be discussed and solved by the students.	Mid-term exams, final exam, homework, quizzes and discussions.
1.4	Compare between solid, liquid and gases and factors affecting	K4 and K5	Lectures Many problems to be discussed and solved by the students.	Mid-term exams, Final exam, homework, quizzes, discussions.
2.0	**Skills**			
2.1	To apply the basic principles of periodic law to predict their various trends	S4	Different web sites on the internet explain the atomic structure Many text books in library demonstrate the importance of compounds	Mid-term exams and final exam including some questions such as (Explain, discuss, comment, compare, etc)

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	To apply fundamental principle for the identification the matter, types of matter, atomic structure etc	S4	Explain different examples of matter	Mid-term exams and final exam including some questions such as (Explain, discuss, comment, compare, etc)
3.0	**Values, autonomy, and responsibility**			
3.1	To present self-teaching for the students and research on the internet	V2, V3 and V4	Homework depending on search in the internet	Evaluation of the homework
3.2	To present an oral explanation for a subject in the area.	V2, V3 and V4	Case study depending on search in the internet	Evaluation
3.3	To show independency for solving problems.	V2	Case study depending on search in the internet	Evaluation

C. Course Content

No	List of Topics	Contact Hours
1.	• **Matter** - Its Properties and Measurements: Types of Matter, Quantities and SI-units, Uncertainty and Significant Figures.	8
2.	• Atoms and the atomic theory, Dalton's theory, Modem view of atomic structure, Isotopes, Introduction to the periodic table, Molecular Formula, Empirical or Simplest Formula, Structural Formula, Formula of ionic compounds.	8
3.	**Mass Relations in Chemistry:** Mole, Molecular Mass,_ Simplest Formula from Chemical analysis, Molecular Formula from Simplest Formula and Mass Relations in Reactions.	8
4.	• **Electronic Structure of Atoms:** Electromagnetic Radiation, The Quantum Theory, Bohr's Theory, De-Broglie Principal, The Modern Theory of Atomic Structure, Pauli Exclusion Principle, Hund's Rule, Electronic Configuration, Isoelectronic, Trends in the Properties of Atoms in Periodic Table, Atomic Radius, Ionic Radius of ions, Ionization Energy, Electronegativity.	7
5.	• **Liquids, Solids and Intermolecular Forces:** Properties of Liquids, Vaporization of Liquids, Vapor Pressure, Some Properties of Solids, Phase Diagrams, Van der Waals Forces, Hydrogen Bonding, Chemical Bonds as Intermolecular Forces.	6
6.	**Gases:** Properties of Gases, The Simple Gas Laws, The Ideal Gas Equation and The General Gas Equation, Mixtures of Gases, Dalton's Law of Partial Pressure, Graham's Law, Real Gas and van der Waals Equation.	4
7.	Covalent bonding, Lewis structures, octet rule, molecular geometry.	4

Total		45
No	**List of Topics**	**Contact Hours**
3.	**List of topics (Practical)**	2
4.	• Identification the safety rules in laboratory	2
3.	• Determination the density of liquid and solid substances	3
4.	• Determination the viscosity of organic liquid	3
5.	• Identification the basic radicals of the salts	3
6.	• Scheme for identification the acidic and basic radicals of the salts	3
7.	• Preparation of sodium carbonate (Na_2CO_3) and sodium bicarbonate ($NaHCO_3$) solutions	3
8.	• Separation of a mixture containing NaCl, SiO_2, and $(NH_4)_2CO_3$	3
9.	• Determination the value of general gas constant (R)	2
10.	• Determination the molecular weight of volatile liquid	2
11.	• Revision	2
12.	• Exam.	2
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework-1	3	2.5
2.	Homework-2	5	2.5
3.	Quiz	6	5
4.	Midterm exam	7 or 8	25
5.	Practical	12	25
6.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Catherine E. Housecroft, Edwin C. Constable, "Chemistry: An Introduction to Organic, Inorganic and Physical Chemistry", 3rd Ed., Pearson Education Limited, 2006. Theodore L. Brown, H. Eugene LeMay, Jr, Bruce E. Bursten, "Chemistry: The Central Science", 10th Ed., Pearson Education, Inc., 2006
Supportive References	Ralph H. Petrucci, William S. Harwood, and F. Geoffrey Herring, "General Chemistry, Principles and Modern Applications", 10th Edition, Prentice Hall, 2009.
Electronic Materials	Electronic references - web sites
Other Learning Materials	Power point - Projector

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, laboratory with equipment.
Technology equipment (projector, smart board, software)	Data show
Other equipment (depending on the nature of the specialty)	none

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student Peer Reviewer	Indirect Indirect
Effectiveness of Students assessment	Academic Development and Quality Committee Peer Reviewer	Indirect Indirect
Quality of learning resources	Student Program Leader	Indirect Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Committee of Curriculum and Plans
REFERENCE NO.	Committee of Academic Development and Quality

DATE	Departmental Council

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :Differentiation and Integration -1	
Course Code: 119 MATH-3	
Program: Bachelor’s in Engineering	
Department: Engineering	
College: Science	
Institution: : King Khalid University	
Version: 2	
Last Revision Date:25/03/2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (1st Level / 1st Year)					

4. Course General Description:

This course is focus on Solution of Equations: The equations of first, second and third degrees, solution by factorization and quadratic formula, solution of inequalities, domain of a function and trigonometric functions. Limits: To study different kinds of limits, left hand limit and right-hand limit. Continuity: Different kinds of discontinuity. Derivatives: Definition of derivative, different rules of derivatives. The slope and the tangent line, Derivative of the sine and cosine, The product and quotient and power rules. Applications of the Derivative: Linear approximation, maximum and minimum problems. The Chain Rule: Derivatives by the chain rule, implicit differentiation.

5. Pre-requirements for this course (if any)**:**

None

6. Pre-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

On successful completion of this course, students should be able to:

- **Acquired knowledge and skills about the basis and theories of the basic fundamentals of Mathematics.**
- **Apply the basic fundamentals of differential calculus in solving problems.**
- **Apply the basic fundamentals of differential calculus in application calculus.**
- **Apply the basic fudamentals to solve different kind of equations and inequalities.**

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid	45	100

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand and know the scientific background of Differential Calculus.	K1		
1.2	Know the processes and methods to solve different kinds of equations and inequalities	K2		
1.3	Understand depth of the theoretical basis of Differential Calculus	K3		•
1.4	Demonstrate knowledge of different approaches that can be used for Differential Calculus.	K4		•

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.5	Familiar to quantities methods appropriate Differential Calculus	K5		
2.0	**Skills**			
2.1	Understand and know the scientific background of Differential Calculus	S1		
2.2	Understand in depth the theoretical basis of Differential Calculus	S2		
2.3	Demonstrate knowledge of different approaches that can be used for Differential Calculus.	S3		
2.4	Familiar to quantities methods appropriate to Differential Calculus	S4		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	**Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.**	**Critical assessment, self-assessment, Rubrics**
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours

1.	*Equations, Inequalities, factorization and quadratic formula and revision of some basic skills of mathematics.*	7
2.	*Equations, Inequalities, factorization and quadratic formula and revision of some basic skills of mathematics.*	7
3	*Trigonometric functions and some properties and identities.*	5
4	*Definition of limits, techniques of finding limits and sandwich theorem.*	7
5	*Continuity, discontinuity and intermediate value theorem.*	4
6	*Definition of derivatives, basic rules of differentiation, techniques of derivatives, limits and derivatives of trigonometric functions, the chain rules, implicit differentiation and applications of derivation in finding the equation of tangent lines.*	7
7	*Rolle's theorem, mean value theorem, extremum, first and second derivative tests, asymptotes and graph of functions.*	4
8	*General review*	4
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (midterm exam)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	E. W. Swokowski, M. Olinick, D. Pence & J. A. Cole, *Calculus*, 6thEdition, PWS Publishing Company, Boston. 1994.
Supportive References	

Electronic Materials	• Websites on the internet that are relevant to the topics of the course. E-learning lms.kku.edu.sa
Other Learning Materials	NA.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 50 students
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title : : Physics - I	
Course Code: 129 PHYS-1	
Program: Bachelor for Engineering	
Department: Physics	
College: Science	
Institution: King khalid University	
Version: 2	
Last Revision Date:26 Mars 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3+1)					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (Level 2 / First Year)					

4. Course general Description:

- Physics and measurements
- Vectors
- Motion in one dimension
- Laws of Motion and Friction
- Work, Energy and Power
- Elastic Properties of Matter
- Fluid
- Thermal Physics
- Electric Current

5. Pre-requirements for this course (if any)**:**

None

6. Pre-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

The purpose of this course is to introduce the fundamentals of physics to the students. After completion of this course, students will have the knowledge of following :
-Principles of physical measurements, conversion of units, dimensional analysis.
- All algebraic processes related to vector quantities.
- Calculation of different parameters dealing with motion in one dimension (average speed, velocity, instantaneous velocity, instantaneous acceleration, free falling objects)
- Newton`s laws of motion, friction force and different applications.
- Work, kinetic energy, work-energy theory and conservative forces. potential energy.
- Buoyant forces, Archimedes principle, pressure of fluids, equation of continuity and Bernoulli’s equation.
- Elastic properties of materials.
- Temperature and heat (Specific and Latent)
- Coulomb's law, electric field for point charge and electrical potential.
- Electric conductivity, electric current and electric energy.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	To define vector, displacement, speed, velocity, force, work, energy,power, pressure,stress, strain, specific heat	K1	Lecture	• Quizzes • assignments • Examinations
1.2	To define stress, strain,young modulus of elasticity, flow rate, Bernoulli theorem, electric field, Ohms law and resistance	K2	Lecture	• Quizzes • assignments • Examinations
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	To differentiate between vectors and scalars, differentiate between speed and velocity, concept of work energy principle.	S1	Lecture	• Quizzes • assignments • Examinations
2.2	To understand the concept of equation of continuity, Bernoulli theorem To differentiate between electric field and electric potential.	S2	Lecture	• Quizzes • assignments • Examinations
2.3	To apply laws of physics studied in this course to daily life situation.	S3	Lecture	Practical
2.4	To apply the concept of electric charge and electric field, laws of resistance from Engineering Physics points of view.	S4	Lecture	Practical
3.0	**Values, autonomy, and responsibility**			
3.1	Numerical problems based on mechanics (vectors, force, work energy, power)	C1	Lecture	• Quizzes • assignments • Examinations
3.2	Numerical problems based on equation of continuity, Bernoulli equation, Young's Modulus of elasticity, Coulumb's law, Ohm's law	C2	Lecture	• Quizzes • assignments • Examinations

C. Course Content

No	List of Topics	Contact Hours
1.	**Measurements, units and vectors.** Standards of Length, Mass and Time, Density, Dimensional Analysis, Conversion of Units, Significant figures Vectors and Scalars, Properties of	10

	Vectors, Addition of vectors, Components of a vector and unit vectors, Product of two vectors.	
2.	**Motion in one dimension** Introduction to position, distance, displacement, average speed and velocity. Instantaneous speed, Average and instantaneous acceleration, uniformly accelerated motion, freely falling motion	10
3	**Newton's Laws of Motion and Friction** Concept of Force, Newton's Laws of Motion, Gravitational force and weight, Objects in equilibrium, Force of friction.	10
4	**Work, Kinetic Energy and Potential Energy** Work done by a constant force and a varying force, Kinetic energy and Work energy theorem, Conservation of energy, Power, Potential Energy, Conservative and Non- conservative forces	5
5	**Fluid Mechanics Pressure**, Variation of pressure with depth, Buoyant forces and Archimedes principle, Fluid dynamics, Equation of continuity, Bernoulli's Equation	10
6	**Elasticity** Elastic properties of Solids, Stress, Strain and Young's modulus of elasticity, Bulk and Shear modulus of elasticity	5
7	**Heat**, Temperature, Specific Heat, Latent Heat Temperature, Thermometers, Temperature Scale, Thermal Expansion of Solids, Heat and Internal Energy, Specific Heat and Principle of Calorimetry, Latent Heat	5
8	**Electric Field and Potential** Properties of electric charge, Charging objects by induction, Coulomb's Law, Electric field. Potential Difference and electric potential, Electric potential	10
9	**Currents and Resistance and Electric Energy and Power** Electric Current, Resistance, Ohm's Law, Electric Power, Resistors in Series and Parallel	10
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid exam	6	15 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Assignment	4 & 8	10 %
3.	Quiz	5	5 %
4	Practical	12	30 %
5	Final exam	13	40 %
6	total		100 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Physics for Scientists and Engineers by Raymond A. Serway and John W. Jewett. ISBN 0534408427 Thomson Brooks/Cole © 2004; 6th Edition
Supportive References	Physics, Volume 1, Robert Resnick, David Halliday, Kenneth S. Krane
Electronic Materials	www.lms.kku.edu.sa to access lecture notes, text book, lab manual, announcements related to the course etc
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom accommodated with 30 seats and equipped with Internet access.
Technology equipment (projector, smart board, software)	2 demonstration rooms and each one accommodated with 15 seats and equipped with Internet access and 15 personal computers.
Other equipment (depending on the nature of the specialty)	Providing educational facilities and models in the lecture

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of students assessment	Academic Development and Quality Committee Peer Reviewer	Indirect Indirect
Quality of learning resources	Student Program Leader	Indirect Indirect
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Committee of Curriculum and Plans
REFERENCE NO.	Committee of Academic Development and Quality
DATE	Departmental Council

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :Differentiation and Integration -2
Course Code: 219 MATH-3
Program: Bachelor's in Engineering
Department: Engineering
College: Science
Institution: : King Khalid University
Version: 2
Last Revision Date:25/03/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	
3. Level/year at which this course is offered: (2nd Level / 1st Year)					
4. Course General Description:					
This course is focus on concept of integration: Identify the correct rule to integrate and use rules to integrate. Identify non-algebraic integrals. Analyze rounding methods and numerical integration. This course introduces students to the basics of integration. It starts with a quick review of derivatives then students learn about antiderivatives of a function. Then students learn some elementary functions which were not covered in Calculus 1 such as exponential and inverse trigonometric functions. Moreover, various integration methods are introduced. Applications of integration are introduced such as finding area, volume, and arc length.					
5. Pre-requirements for this course (if any):					
119 MATH-3					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
On successful completion of this course, students should be able to: ○ **Analyze the relationship between differentiation and integration.** ○ **Calculate integrals of basic functions and find area and volume.** ○ **Compare different integration methods and justify the choice for each method**					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	45	100

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Knowledge By the end of the course, students should be able to understand functions, differentiation, integration, Area and volume with the help of integration, Definite integral, indefinite integral, A general review of what has been taught in the previous course 129 MATH-3. Focusing on certain concepts: derivation concept and its rules, the study of some usual functions and draw their curves.	K1	**Lectures, up today, textbooks, handouts, develop skills in using library and other learning resources,**	**Exams, tutorials, supervision presentations, essays, feedback on written work and homework.**
1.2	Anti-derivative concept, the main theory of anti-derivative, the concept of definite and indefinite integration, area,	K2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	main value theorem, change of variables of integration			
1.3	Calculate the area between a set of curves, types of areas: the area of type Rx and type Ry calculate the rotational volume, calculate the length of an arc, the concept of rotational area and how to calculate.	K1		•
1.4	The concept of a one-to-one function, the concept of the inverse function, the domain and range of the inverse function, how to get the inverse function, the similarity of the curves of the function and its inverse, the derivative of the inverse function without getting the explicit form of it, the concept of logarithmic function as integration, the exponential function as the inverse of the logarithmic function, differentiation and integration of logarithmic and exponential functions, inverse trigonometric functions, differentiation and integration of inverse trigonometric functions, hyperbolic functions, differentiation and integration of hyperbolic functions, inverse hyperbolic functions, differentiation and integration of inverse hyperbolic functions	K4		•
1.5	Integration methods: by parts, trigonometric substitutions, integration of trigonometric functions, partial fractions	K5		
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Ability to understand functions, formulas for differentiation of different types of functions	S1	Tutorials, Group working, problem solving, discussion, feedback on written work	Exams, tutorials, supervision, presentations, feedback on written work and homework, critical assessment, peer assessment, self-assessment.
2.2	Understanding of different integration formulas and their applications in different questions	S2		
2.3	Able to use both integration and differentiation together in different types of questions	S1-2		
2.4	Ability to write and implement algorithms to solve different numerical issues.	S1		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	***A general review of knowledge learned in MATH 1511*** • ***Differentiation rules*** ***Studying and drawing functions using first and second derivative***	7
2.	***Anti-derivatives and integrals:*** • ***Integration and differential equations*** • ***Definite and indefinite integration, Riemann sums and integral*** • ***Relation between area and integration*** • ***Mean value theorem and the fundamental theorem of calculus.*** ***Integration by basic substitution (change of variables).***	7
3	***Applications of integration:*** • ***Area bounded by a set of curves.*** • ***Types of areas: Rx and Ry***	4

	• *Rotational volumes*	
4	*Inverse functions and some elementary functions* . *Injective, surjective, and bijective functions* a. *Inverse function* b. *Logarithmic function* c. *Exponential function* d. *Inverse trigonometric functions* *Hyperbolic functions, inverse hyperbolic functions*	7
5	*Integration methods:* • *Integration by parts* • *Integration using trigonometric substitution and completing the square.*	4
6	*Integration of rational functions.*	7
7	*Applications of integration*	4
8	*General review*	5
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (Mid Term Exam)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	**E. W. Swokowski, M. Olinick, D. Pence & J. A. Cole, *Calculus*, 6thEdition, PWS Publishing Company, Boston. 1994.**
Supportive References	
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. E-learning lms.kku.edu.sa
Other Learning Materials	NA.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 50 students
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title :Physics-2
Course Code: 219 PHYS-4
Program: Bachelor's in Engineering
Department: Physics
College: Science
Institution: : King Khalid University
Version: 2
Last Revision Date:26/3/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
4 (3+1)					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (Level 3 / Second Year)					

4. Course General Description:

This course is to present it in simple and understandable way to students to explain the fundamentals of general as well as engineering physics and its applications in life. They will learn the adaptability to new developments in science and technology during pursuing their engineering degree. As their course contains topics on Vibrations, waves, optics, modern physics and materials science, so they will learn and understand the different phenomenon of engineering physics and its applications as following:

Vibrations (simple harmonic motion, to compute the frequency and period of simple harmonic motion, to determine the position, velocity and acceleration for simple harmonic motion and to compute kinetic, potential and mechanical energy of a simple harmonic oscillator with suitable examples).

Light and sound waves (wave, equation for waves, wave superposition, the nature of sound waves, factors affecting sound waves, sound intensity level of sound waves, Doppler effect. interference, diffraction (single slit) and polarization of light).

Modern physics (Black body radiation, Planck's quantum hypothesis, photoelectric effect, photon, de Broglie wavelength.

Materials Science (Bohr model of atoms, specific heat of solids and Superconductivity).

In addition to some experiments in light and waves, modern physics and materials science.

5. Pre-requirements for this course (if any)**:**

129 PHYS-4

6. Pre-requirements for this course (if any)**:**

None

7. Course Main Objective(s):

After completing this course, the student should be able to know, understand, and use the mathematical concepts and laws related to topics of SHM, waves, optics, modern physics and materials science. On the other hand, the student will be:

1. Familiar with types of oscillations.

2. Intimate with the wave equation and its uses.

3. Understand combination and interference of electromagnetic and sounds waves.

4. Understands basic concepts related to blackbody radiation, photoelectric phenomena, and Compton dispersion.

5. Understands what is meant by semiconductors, their types, and applications

6. Fluent in analyzing practical experiments results and writing reports

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	15
3.	**Field**	0
4.	**Tutorial**	15
5.	**Others (specify)**	0
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.1	Learn the basic theories and experimental results of some phenomena in waves, vibrations, and light.	K1	Lectures and experimental lab.	Homework assignments, short quizzes Write Exams Reports
1.2	Think in the interest of the concepts and principles of waves, modern physics and superconductivity in engineering.	K2		
1.3	Explain the operational principle, analysis, and design of; Standing waves, Newton rings and electrons diffraction.	K3		
2.0	**Skills**			
2.1	Interpret some physical phenomena in vibrations, optics sound and modern physics.	S1	Lectures and Lab	Exams, Assignments, Quizzes
2.2	Relate the concepts and principles of modern physics and materials science with the engineering applications.	S2	Group discussions	Exams, Assignments, Quizzes
2.3	Write a weekly report including the results, analysis and discussion for each experiment.	S3		
3.0	Values, autonomy, and responsibility			
3.1	Evaluate some scientific problems by students and write the corresponding reports	V1	Discussions	Presentations

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	Fluent in communicating with others and cooperating with them.	V2	Demonstrations	Group report
3.3	Summarize the main points of the course and develop them through self-learning.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	Simple Harmonic Motion	10
2.	One dimensional wave motion and Sound	12
3.	Interference, Diffraction and Polarization of light	9
4.	Plank's quantum theory of radiation	2
5.	Photoelectric effect and photons	2
6.	Compton Scattering	2
7.	Wave properties of particles	2
8.	Atomic Spectra and Bohr model of the atom	2
9.	Lattice vibrations and specific heat of Solids	2
10.	Superconductivity and introduction to Quantum Statistics	2
Total		**45**

Practical:

No	List of Topics	Contact Hours
1	General definition of the laboratory (experiments - reports - graph - safety instructions)	2
2	Simple pendulum experiment	**2**
3	Experiment with standing waves	**2**

4	Balmer's series of Hydrogen atom experiment	**2**
5	Tutorial based on experiment 2	**2**
6	Electron diffraction experiment	**4**
7	Newton's rings experiment	**4**
8	Planck constant experiment (Tutorial)	**4**
9	A review of all laboratory trials with a general discussion of the weekly reports	**4**
10	Tutorial based on experiment 3-6	**4**
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mid Exam	7th	20%
2.	Quiz (Blackboard)	7th	10%
3.	Assignment I	6th	2.5%
4.	Assignment II	11th	2.5%
5.	Practical Part (reports and exams)	12th	25%
6.	Final exam	13th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	**Book: University Physics by Western and Crummet**
Supportive References	**University Physics by Resnick and Halliday**
Electronic Materials	**1- YouTube videos for engineering physics** **2- Arabic websites for Physics** **3- E- learning blackboard facility provided by the university.** **4- The internet in general.**
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Available classroom and laboratory
Technology equipment (projector, smart board, software)	Available
Other equipment (depending on the nature of the specialty)	Some apparatus is required so as to maintain the quality of lab learning process.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Questionnaires (Direct)
Effectiveness of students assessment	Program Leaders, Peer Reviewer	Periodic self- assessment of the program. (Indirect)
Quality of learning resources	Faculty, Peer Reviewer	Analyzing of the results of students (Direct)
The extent to which CLOs have been achieved		
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Physics department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	26-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification

(Bachelor)

Course Title :Differentiation and Integration -3	
Course Code: 229 MATH-3	
Program: Bachelor’s in Engineering	
Department: Mathematics	
College: Science	
Institution: : King Khalid University	
Version: 2	
Last Revision Date:25/03/2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (3rd Level / 2nd Year)					
4. Course General Description:					
This course discuss the theory of functions of several variables including topics ranging from limits and continuity, partial differentiation up to double integrals (integrals for functions of two variables). The students learn limits continuity and partial differentiation for such kind of functions as well as the chain rule technique, double integral evaluation, and their applications. In the second part, the course focuses on sequences, which are used to build series. The students learn to manipulate sequences and series together with different tests for convergence. The course makes a relation between series and functions of one variable with addressing power series theory and applications.					
5. Pre-requirements for this course (if any)**:**					
219 MATH-3					
6. Pre-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
On successful completion of this course, students should be able to: • Describe and distinguish between properties of functions of one variable and several variables • Describe and distinguish between properties of partial differentiation Techniques of double integration • Describe and distinguish between properties of sequences, series and power series.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning	45	100
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	By the end of the first part of this course, the student will learn functions of several variables and precisely: Limits, the two-path rule; continuity; partial differentiation; implicit differentiation for functions of two and three variables; chain rule; extrema (local minima and maxima and saddle points); tangent planes and normal lines; double integrals and their applications	K1	**Lectures, up today, textbooks, handouts, develop skills in using library and other learning resources,**	**Exams, tutorials, supervision presentations, essays, feedback on written work and homework.**
1.2	Anti-derivative concept, the main theory of anti-derivative, the concept of definite and	K2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	indefinite integration, area, main value theorem, change of variables of integration			
1.3	Calculate the area between a set of curves, types of areas: the area of type Rx and type Ry calculate the rotational volume, calculate the length of an arc, the concept of rotational area and how to calculate.	K1		•
1.4	The concept of a one-to-one function, the concept of the inverse function, the domain and range of the inverse function, how to get the inverse function, the similarity of the curves of the function and its inverse, the derivative of the inverse function without getting the explicit form of it, the concept of logarithmic function as integration, the exponential function as the inverse of the logarithmic function, differentiation and integration of logarithmic and exponential functions, inverse trigonometric functions, differentiation and integration of inverse trigonometric functions, hyperbolic functions, differentiation and integration of hyperbolic functions, inverse hyperbolic functions, differentiation and integration of inverse hyperbolic functions	K4		•
1.5	Integration methods: by parts, trigonometric substitutions, integration of trigonometric functions, partial fractions	K5		
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Ability to differentiate between properties of functions of one variable and several variables	S1	Tutorials, Group working, problem solving, discussion, feedback on written work	Exams, tutorials, supervision, presentations, feedback on written work and homework, critical assessment, peer assessment, self-assessment.
2.2	Ability to differentiate between sequences, series and power series.	S2		
2.3...	Use of learned techniques to solve modeling life issues.	S3		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	Functions of several variables of several variables, domain and range, level curve of a function. Limits and continuity : limit notation, definition of limit, two-path rule, definition of continuous functions Partial derivatives: Definition of the first partial derivatives, notations for partial derivatives, second partial derivatives.	10
2.	Chain rules: chain rule Lines. Extrema of functions of several variables extrema, test for local extrema.	7
3	Double Integration: Definitions and evaluation theorems for double integrals. Area and Volume Sequences: Notation, definitions and theorems	10

4	Convergent or Divergent Series: Definitions, theorems, nth-term test. Positive- Term Series: Definitions, theorem, Basic and limit comparison tests The Ratio and Root tests. Alternating series and absolute convergence: Definitions, theorems,	12
5	Power series: Definitions, theorems Power series representations of functions: Definitions, theorems Maclaurin and Taylor series	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (mid Term Exam.)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Calculus of Several Variables, Pence, Dennis D., Cole, Jeffery A., Pence, Dennis, Olinick, Michael, Swokowski, Earl Published by Brooks/Cole Pub Co (1995)
Supportive References	An Introduction to Functions of Several Variables Mariano Giaquinta, Giuseppe Modica, Birkhauser, 2000.
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. E-learning lms.kku.edu.sa
Other Learning Materials	Any book on Integration and Differentiation 3 available at the Central Library.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 25 students

Items	Resources
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :Differential equations
Course Code: 329 MATH-3
Program: Bachelor's in Engineering
Department: Mathematics
College: Science
Institution: : King Khalid University
Version: 2
Last Revision Date:25/03/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required			☐Elective	
3. Level/year at which this course is offered: (4th Level / 2nd Year)					
4. Course General Description:					
This course discusses the basic concepts - first-order differential equations - existence and uniqueness for initial – boundary value problems - separable variables - homogeneous equations - exact equations. linear equations - equations of Bernoulli. - Linear differential equations of higher-order - homogeneous equations with constant coefficients, method of undetermined coefficients, method of variation of parameters. differential equations with variable coefficients, power series solution about ordinary and singular points.					
5. Pre-requirements for this course (if any):					
219 MATH-3					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					
On successful completion of this course, students should be able to: • **Learning the basic concepts and methods for solving first order differential equations** • **Distinguish between the different types of differential equations.** • **Solving the higher order linear differential equations.**					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	45	100

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Ability to classify and recognize linear systems of differential equations and non-linear differential equations.	K1	**Lectures, up today, textbooks, handouts, develop skills in using library and other learning resources,**	**Exams, tutorials, supervision presentations, essays, feedback on written work and homework.**
1.2	Understanding the existence and uniqueness of solutions for initial value problems and the linear independence of solutions .	K2		
1.3	Recognition the list of different methods to solve ordinary differential equations.	K3		•

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.0	**Skills**			
2.1	Solve analytically a first order differential equation.	S1	Tutorials, Group working, problem solving, discussion, feedback on written work	Exams, tutorials, supervision, presentations, feedback on written work and homework, critical assessment, peer assessment, self-assessment.
2.2	Recognizing the importance of a differential equations as a powerful tool to better understand some scientific and engineering problems.	S2		
2.3	Explain different methods to solve linear and higher order differential equations.	S3		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	**Preliminary definitions of differential equations:** Definition of differential equations, order, and type of differential equations. Definition of initial value problem, and theory of existence and uniqueness of solution.	6
2.	**First order differential equations:** Separable values, homogenous equations, exact equations, linear equations, integrating factor, Bernoulli and Ricatti equations.	12
3	**Second order differential equations:** Linear dependence and linear independence, Wronskian function, fundamental set of solution, reduction of order, homogenous linear equation with constant coefficients, undetermined coefficient method,	15

	differential operator, method of differential operator, variation of parameters.	
4	**Differential equations with variable coefficients:** Cauchy equation, solution of differential equations using power series method about ordinary and singular points.	12
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (mid Term Exam.)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	D. G. Zill, “A first course in differential equations”, 11 ed.(2009) ,
Supportive References	D.G. Zill and M.R. Cullen, “Differential Equations with Boundary Value Problems”, 9th Ed., Brooks/Cole, (2009).
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. E-learning lms.kku.edu.sa
Other Learning Materials	Any book on ordinary differential equations available at the Central Library.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 25 students
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service

Items	Resources
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :Linear Algebra
Course Code: 329 MATH-3
Program: Bachelor's in Engineering
Department: Mathematics
College: Science
Institution: : King Khalid University
Version: 2
Last Revision Date:25/03/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (4th Level / 2nd Year)					

4. Course General Description:

Course Description

This course discusses the vectors in Rn, vector addition and scalar multiplication, dot (Inner) Product, located vectors in R3 (Spatial Vectors), and complex vectors in Cn. Secondly, the course covers the followings:

- Algebra of Matrices

  Introduction of Matrices, Matrix Addition and Scalar Multiplications, Summation Symbol, Matrix Multiplications, Transpose of a Matrix, Square Matrices, Powers of Matrices, Polynomials in Matrices, Invertible (Nonsingular) Matrices, Special Types of Square Matrices.
- Systems of Linear Equations

  Introduction and basic definitions, Solutions of equivalent systems, Elementary Operations, Small Square Systems of Linear Equations, Systems in Triangular and Echelon Forms, Gaussian Elimination, Echelon Matrices, Row Canonical Form, Row Equivalence, Gaussian Elimination, Matrix Formulation, Matrix Equation of a System of Linear Equations, Systems of Linear Equations and Linear Combinations of Vectors, Homogeneous Systems of Linear Equations.
- Vector Spaces

  Introduction of Vector Spaces, Examples of Vector Spaces, Linear Combinations, Spanning Sets, Subspaces, Linear Spans, Row Space of a Matrix, Linear Dependence and Independence, Basis and Dimension, Application to Matrices, Rank of a Matrix, Sums and Direct Sums, Coordinates.
- Linear Mappings

Introduction of Mappings, Functions, Linear Mappings (Linear Transformations), Kernel and Image of a Linear Mapping, Singular and Nonsingular Linear Mappings, Isomorphisms, Operations with Linear Mappings.

5. Pre-requirements for this course (if any):

None

6. Pre-requirements for this course (if any):

None

7. Course Main Objective(s):

On successful completion of this course, students should be able to:

This course will introduce students to:

Linear algebra has in recent years become an essential part of the mathematical background required by mathematicians and mathematics teachers, engineers, computer scientists, physicists, economists, and statisticians, among others. This requirement reflects the importance and wide applications of the subject matter. The first three chapters treat vectors in Euclidean space, matrix algebra, and systems off linear equations. These chapters provide thee motivation and basic computational tools for the abstract investigations off vector spaces and linear mappings which follow. After chapters on inner product spaces and orthogonality and on determinants, there is a detailed discussion of eigenvalues and eigenvectors giving conditions for representing a linear operator by a diagonal matrix. This naturally leads to the study of various canonical forms, specifically, the triangular, Jordan, and rational canonical forms.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	45	100
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand and apply matrix and vector algebra, and relate matrices to linear transformations. Understand and Apply fundamental concepts of vector spaces such as span, linear independence, basis, and dimension	K1	Lectures, up-to-date textbooks, hand-outs, develop skills in using library and other learning resources, use of the Internet.	Exams, tutorials, supervision, presentations, essays, feedback on written work and homework.
2.0	**Skills**			
2.1	Apply matrix and vector algebra, and relate matrices to linear transformations. Solve systems of linear equations using Gauss elimination methods	S1	Tutorials, Group working, problem-solving, discussion, feedback on written work, exam papers, critical assessment, peer assessment, self-assessment.	Exams, tutorials, supervision, presentations, feedback on written work and homework, exam papers, critical assessment , peer assessment , self-assessment .
2.2	Calculate the determinant of square matrices. Perform basic matrix operations.	S2		
2.3	Determine whether the matrix is positive definite, negative definite or indefinite by finding Eigen values.	S3		
2.4	Apply fundamental concepts of vector spaces such as span, linear independence, basis, and dimension	S4		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	Spatial Vectors	6
2.	Algebra of Matrices	9
3.	Systems of Linear Euqations	9
4.	Vector Spaces	9
5.	Linear Mappings	6
6.	Diagonalization: Eigenvalues and Eigenvectors	6
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (Mid term exam)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	**Elementary Linear Algebra, by Howard Anton and Chris Rorres 11th Edition**
Supportive References	**Linear Algebra, Schaum's outlines 4th Edition**
Electronic Materials	• Websites on the internet that are relevant to the topics of the course. E-learning lms.kku.edu.sa
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 25 students
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :	Numerical Methods
Course Code:	329 STAT-2
Program:	Bachelor's in Engineering
Department:	Mathematics
College:	Science
Institution: :	King Khalid University
Version:	2
Last Revision Date:	25/03/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (6th Level / 3rd Year)					
4. Course General Description:					
This course dealing with statistical concepts including, Collection and presentation of data either in tables or graphs, measure of central tendency, dispersion and variation and shape parameters, Correlation and regression, probability distributions.					
5. Pre-requirements for this course (if any):					
None					
6. Pre-requirements for this course (if any):					
None					
7. Course Main Objective(s):					

On successful completion of this course, students should be able to:
On successful completion of this course, students should be able to:

- Recognize presentation of data (grouped and ungrouped data).
- Should know how to find the arithmetic mean, the coding method for computing Mean the weighted mean. The median. The mode. The geometric mean. The Harmonic mean. Quartiles, Deciles and Percentiles.
- Recognize random experiment, sample space, events, and operations on the events, axioms of probability, assignment of probability, random variables and Probability distribution. Extract the mean, the variance and the standard deviation of the random variables.
- Have Some special probability distributions.

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom	30	100

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe data graphically and in table- compute measures of centrality, dispersion and variation- Shape parameters (Skewness and Kurtosis)	K1	Lectures, up-to-date textbooks, hand-outs, develop skills in using library and other learning resources, use of the Internet	Exams, tutorials, supervision, presentations, essays, feedback on written work and homework.
1.2	Understand correlation, covariance, correlation coefficient and how these quantities relate to the independence of random variables	K2		
1.3	Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional, probability, independence.	K3		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	Understand mathematical descriptions of random variables including probability mass functions (PMFs), cumulative distribution functions (CDFs), probability distribution functions (PDFs).	K4		
2.0	**Skills**			
2.1	Set up and work with discrete random variables. In particular, understand the Bernoulli, binomial, geometric and Poisson distributions.	S1	Tutorials, Group working, problem-solving, discussion, feedback on written work, exam papers, critical assessment, peer assessment, self-assessment.	Exams, tutorials, supervision, presentations, feedback on written work and homework, exam papers, critical assessment, peer assessment, self-assessment.
2.2	Work with continuous random variables. In particular, know the properties of uniform, normal and exponential distributions.	S2		
2.3	Be able to calculate various moments of common random variables including at least means, variances and standard deviations.	S3		
2.4	Be able to calculate the probability density function(pdf) and cumulative distribution function (cdf) of a random variable	S4		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours

1.	**Useful definitions in Descriptive Statistics:** Population-Sample-Variables (Qualitative and Quantitative), Frequencies, relative frequencies and percentages (for qualitative variables, ungrouped data and grouped data), Frequency distribution table, Cumulative frequencies, Cumulative relative frequencies.	3
2.	**Graphical Representation of Data:** Bar Graph-Pie graph- Histogram-Cumulative frequency graph, polygon graph.	2
3	**Measures of central tendency:** Mode (Qualitative variables-ungrouped data-grouped data, Median (ungrouped data-grouped data), Arithmetic mean (ungrouped data-grouped data), Weighted Mean, Geometric and Harmonic means (ungrouped datagrouped data).	4
4	• **Measures of dispersion:** Range, Semi-iterguartile, -Mean deviation, Variance, Standard Deviation, coefficient of variation. • **Measures of position:** Quartiles-Deciles -Percentiles **Measure of Skewness and Kurtosis**	4
5	**Correlation and Regression** Scatter plot, Pearson correlation coefficien-t, Spearsman's rank correlation coefficient, Regression line and Coefficients of regression.	5
6	**Principles of Probability Theory** Sample space and Events, Counting Techniques (Fundamental basics, Addition Rule, Multiplication Rule Arrangement, Permutation and Combinations), Definition of the probability and its applications, Conditional probability, Independence of events and Bayes theorem and its applications.	5
7	**Random variables** • Concept of real random variable, Probability of a random variable Probability density function(pdf) and Cumulative Distribution Function, Distribution Functions of Discrete and continuous Random Variables. • Moments, Expectation, Variance and Standard Deviation of Random Variables	4
8	**Distributions of random variables** • Discrete Distributions: Bernoulli Distribution, Binomial Distribution, Geometric Distribution, Poisson Distribution, • Continuous distributions: Uniform Distribution, Normal distribution	3
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly starting from the 3rd week	30
2.	Partial exam (mid-term exam)	8th or 9th	30
3.	Final exam		40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	*Elementary Statistics: A Step-by-Step Approach* by Allan G. Bluman is the 10th Edition, published in 2018 by McGraw-Hill Education. The print ISBN is 9781259755330.
Supportive References	Work out statistics for Advanced level (Ball. A. and Buckwell, G.)
Electronic Materials	• Websites such as Stack Overflow and YouTube channels like Stat Quest offer valuable resources relevant to the course topics, providing insights and explanations that can aid learning. • E-learning Platform: The KKU Learning Management System (lms.kku.edu.sa) is a convenient hub for course materials and online learning resources. • Academic Articles from journals, including the Journal of Statistics Education, can deepen understanding by illustrating real-world applications of statistical concepts.
Other Learning Materials	• Flashcards, such as those offered by Quizlet, are useful tools for reinforcing memory and facilitating quick reviews. • Mobile applications (Apps) like StatDisk assist students with calculations and data analysis, making them valuable resources for students engaged in statistics.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 15 students

Items	Resources
Technology equipment (projector, smart board, software)	Data show device, Video Conference system and Smart boards
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Peer Reviewers	Indirect
Effectiveness of students assessment	Peer Reviewers	Direct
Quality of learning resources	Students, Peer Reviewers	Indirect
The extent to which CLOs have been achieved	Faculty, Program Leaders	Direct
Other: Quality of learning outcome	Quality and Development Committee	Report

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title :	Numerical Methods
Course Code:	419 MATH-3
Program:	Bachelor's in Engineering
Department:	Mathematics
College:	Science
Institution: :	King Khalid University
Version:	2
Last Revision Date:	25/03/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (6th Level / 3rd Year)					
4. Course General Description:					

This course covers the following points:

- **Rounding error, conditioning, and numbers representation on**
- **computers**
- **Numerical methods to solve nonlinear equations:**
- **Bisection method, fixed-point method, Newton method, approximation, and error**
- **analysis.**
- **System of nonlinear equations: Newton method**
- **System of linear equation:**
- **Direct methods: Gauss elimination, partial pivoting.**
- **Iterative methods: Jacobi method, Gauss-Seidel method, error analysis.**
- **Functions' interpolation and approximation:**
- **Polynomial approximations: exact, missing, and experimental data. Finite differences,**
- **Lagrange interpolation, Newton formula, best approximation, error analysis.**
- **Cubic splines interpolation: Natural cubic splines.**
- **Numerical integration.**
- **Use MATLAB for the numerical algorithms.**

5. Pre-requirements for this course (if any):

319 MATH-3 Differential equations

6. Pre-requirements for this course (if any):

None

7. Course Main Objective(s):

On successful completion of this course, students should be able to:

- **Solve mathematical problems difficult to solve analytically as finding the roots of equations and computing the integrals.**
- **Use direct and iterative methods for solving systems of linear equations.**
- **Use interpolation and least squares for Data modeling.**

- **Analyze the approximation error.**
- **Use MATLAB for the numerical algorithms.**

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	45	100
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	--
3.	**Field**	--
4.	**Tutorial**	
5.	**Others (specify)**	--
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognize the computer arithmetic, error analysis; solving nonlinear equations in one variable.	K1	Lectures, up-to-date textbooks, hand-outs, develop skills in using library and other learning	Exams, tutorials, supervision, presentations, essays, feedback on
1.2	Knowing the direct and iterative methods for solving linear systems	K2		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.3	Recognize the interpolation and polynomial approximation, cubic spline interpolation; least squares approximation	K3	resources, use of the Internet.	written work and homework.
1.4	Recognize the numerical differentiation and integration.	K4		
2.0	**Skills**			
2.1	Ability to differentiate between analytical solutions and (approximate) numerical solutions	S1	Tutorials, Group working, problem-solving, discussion, feedback on written work, exam papers, critical assessment, peer assessment, self-assessment.	Exams, tutorials, supervision, presentations, feedback on written work and homework, exam papers, critical assessment, peer assessment, self-assessment.
2.2	Ability to choose and use different numerical methods	S2		
2.3	Ability to check the error analysis of numerical methods.	S3		
2.4	Ability to write and implement algorithms to solve different numerical issues.	S4		
3.0	Values, autonomy, and responsibility			
3.1	Adhere to ethical values and excellence in professional practices.	V1	Feedback, experiential learning, structured experiences in groups, self-assessment, profiling.	Critical assessment, self-assessment, Rubrics
3.2	Able to articulate awareness of and demonstrate personal characteristics and critical thinking that positively impact the learning process.	V2		
3.3	Take full responsibility for initiating, identifying, amending, and achieving aims.	V3		

C. Course Content

No	List of Topics	Contact Hours
1.	Rounding error, conditioning, and numbers representation on computers	3
2.	**Numerical methods to solve nonlinear equations:**	6

	Bisection method, fixed-point method, Newton method, approximation, and error analysis.	
3	System of nonlinear equations: Newton method	6
4	**System of linear equation:** • Direct methods: Gauss elimination, partial pivoting. • Iterative methods: Jacobi method, Gauss-Seidel method, error analysis	10
5	**Functions' interpolation and approximation:** • Polynomial approximations: exact, missing, and experimental data. • Finite differences, Lagrange interpolation, Newton formula, best • approximation, error analysis. Cubic splines interpolation: Natural cubic splines.	8
6	**Numerical integration:** • Using closed Newton's cotes formula (Trapezoidal and • Simpson's rules). • Numerical differentiation: • First derivatives, forward, backward and central difference, Second derivative approximation, central difference.	6
7	**Ordinary Differential Equations:** • Euler method, Runge-Kutta Methods (of 4th order), Boundary-Value and Eigenvalue problems.	6
	Total	**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical applications (solutions exercises), quizzes, and homework	Weekly	35
2.	Partial exam (mid term exam)	7	25
3.	Final exam	13	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Numerical Methods S.R.K. Iyengar, R.K. Jain, Published by New Age International (P) Ltd., Publishers, 2009.
Supportive References	- Numerical Analysis, by Richard L. Burden and J. Douglas Faires, 9th ed. Brooks/Cole, 2011. - Numerical Methods, Rao V. Dukkipati, New Age International (P) Ltd., Publishers, 2010 - Elementary Numerical Analysis, 3rd edition, Atkinson, Han, John Wiley & Sons, Inc., 2004 - Numerical Methods for Engineers, 7th Edition by Steven C. Chapra and Raymond P. Canale, McGraw-Hill, 2014.
Electronic Materials	http://www.phengkimving.com/ https://sites.google.com/site/ecalculuscsu/index https://www.intmath.com/ http://archives.math.utk.edu/visual.calculus/ https://www.purplemath.com/modules/index.htm https://math.hmc.edu/calculus/tutorials/
Other Learning Materials	Students might use available ICT to accomplish their computer duties using: MATLAB, MAPLE, MATHEMATICA.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room for 25 students
Technology equipment (projector, smart board, software)	• Data show device, Video Conference system and Smart boards Computers loaded with modern software and connected to Internet service
Other equipment (depending on the nature of the specialty)	Not Applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer Reviewer + Students	Direct
Effectiveness of students assessment	Peer Reviewer + Q&D Committee	Direct
Quality of learning resources	Programs & Curricula Committee + Q&D Committee	Direct
The extent to which CLOs have been achieved	Quality and Development Committee	Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Mathematics Department Council
REFERENCE NO.	Committee of Academic Development and Quality
DATE	25-3-2023

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

3 Course Specifications Of General Engineering Courses and Courses from Other Departments

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2023
TP-153

Course Specification

(Bachelor)

Course Title: Creativity and Innovation	
Course Code: 221-GE-2	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(2)					
2L + 0 P = 2					
2. Course type					
A.	☐University	☐College	Department	☐Track	☐Others
B.	Required		☐Elective		
3. Level/year at which this course is offered: (4th /2nd)					
4. Course General Description:					
Creativity and innovation are integral to an organization's ability to survive and thrive in today's competitive marketplace. The main purpose of the course is to provide ample training and exposure to the students to be able to work independently and innovatively in new projects and work assignments. The specific aim is to inculcate innovation based thinking ability to approach professional challenges.					
5. Pre-requirements for this course (if any): NIL					
6. Pre-requirements for this course (if any): NIL					
7. Course Main Objective(s):					
This course covers and concentrates on principles of material science such as atomic structure and interatomic bounding, crystal structure of materials, theory of diffusion, imperfections in crystals, mechanical testing and evolution of materials, phase diagram and cooling curves of metals and alloys, iron-carbide diagram for steel and cast iron.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the influence of problem-solving techniques, team processes, and environmental conditions on creativity in organizations.	**PLO1.1**	**Lectures**	**Midterm** **Assignment** **Course Presentation**
2.0	**Skills**			
2.1				
3.0	**Values, autonomy, and responsibility**			
3.1	Combine the roles of skill, experience, motivation, and culture in a creative endeavor	**PLO3.3**	**Lectures**	**Quizzes** **Lab** **Midterm** **Assignment**
3.2	Illustrate some potential disruptive innovations and take advantage of 'open' innovation	**PLO3.3**	**Lectures**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
3.3	Develop case study analysis skills (specifically, identifying critical issues in case	**PLO3.3**	**Lectures**	**Quizzes** **Midterm** **Assignment**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	studies and applying course material to case studies).			**Final**
3.4	Analyze the process involved in managing creativity or innovation effectively, and apply this knowledge to your own creative idea or innovation	**PLO3.3**	**Lectures**	

C. Course Content

No	List of Topics	Contact Hours
1.	What is creativity and innovation	3
2.	The need for creativity, invention and innovation	2
3.	Sources of, and barriers to creativity & innovation	3
4.	Creativity tools	2
5.	Creative thinking and idea generation	4
6.	Types and dimensions of innovation	4
7.	The innovation process	4
8.	The need for creativity, invention and innovation	4
9.	Sources of, and barriers to creativity & innovation	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	5-6	15%
2.	Midterm Exam 2	14-13	15%
3.	Quizzes and Assignments	2, 8, 13	30%
4.	Final exam		40%
5.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	**Lecture Handouts.** **Class Notes**
Supportive References	
Electronic Materials	
Other Learning Materials	**1. Business Model Canvas & Innovation** **2. Driving Strategic Innovation** **3. Value Chain Dynamics** **4. Virtuoso Team**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom with 50 seats**
Technology equipment (projector, smart board, software)	**LCD Projector**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2023
TP-153

Course Specification
(Bachelor)

Course Title: Technical Reports Writing
Course Code: 301 NGL-2
Program: Bachelor in Mechanical Engineering
Department:
College: College of Languages & Translation/ The English Language Centre
Institution: King Khalid University, Abha, Saudi Arabia
Version:10
Last Revision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(2)					
2L + 0 P = 2					
2. Course type					
A.	☐University	☐College	Department	☐Track	☐Others
B.	Required		☐Elective		
3. Level/year at which this course is offered: (5th / 3rd)					
4. Course general Description:					
This course develops students' ability to write clear, concise, and well-organized technical reports for engineering and scientific contexts. It covers essential elements such as report structure, data presentation, visual aids, referencing, and formal language use. Students learn to communicate technical information effectively to both specialist and non-specialist audiences. Emphasis is placed on clarity, objectivity, and professional formatting standards. By the end of the course, students will be able to plan, draft, edit, and present comprehensive technical reports aligned with industry expectations.					
5. Pre-requirements for this course (if any): NIL					
012 ENG-6					
6. Course Main Objective(s):					
1. To help develop communicative writing skills 2. To enrich the understanding of the roles that writing and reading play in activities outside and inside the university. 3. To offer a structured approach to writing. 4. To familiarize students with the process of writing. 5. To develop their grammar and mechanical writing skills. 6. To enable students to write technical reports.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
2.0	**Skills**			
2.1	Apply the rules of capitalization and proper use of punctuation in technical writing	**KLO8 (PLO2.7)**	**Lectures**	**Quizzes Lab Midterm Assignment**
2.2	Demonstrate an understanding of the concept and structure of paragraphs	**KLO8 (PLO2.7)**	**Lectures**	**Quizzes Lab Midterm Assignment Final**
2.3	Systematic Thinking Skills, Comparing & Contrasting Skills, Analogical reasoning	**KLO8 (PLO2.7)**	**Lectures**	**Quizzes Midterm Assignment Final**
2.4	Develop the interpersonal skills and capacity to carry responsibility	**KLO8 (PLO2.7)**	**Lectures**	
2.5	Develop Communication, Information Technology and Numerical Skills	**KLO8 (PLO2.7)**	**Lectures**	**Midterm Assignment Course Presentation**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			

C. Course Content

No	List of Topics	Contact Hours
1.	Warming up/ Orientation	2
2.	Unit 1: Part 1: Organization	2
3.	Unit 1: Part 2: Grammar & Mechanics	2
4.	Unit 1: Part 3: Sentence Structure	2
5.	Unit 1: Part 4: The Writing Process	2
6.	Unit 2: Prewriting Brainstorming Part 1: Organization	2
7.	Unit 2 Part 2: Sentence Structure	2
8.	Unit 2 Part 3: Grammar & Mechanics	2
9.	Unit 2 Part 4: The Writing Process	2
10	Unit 3 Prewriting Descriptive Details Part 1 Organization	2
11	Unit 3 Part 2 Grammar & Mechanics	2
12	Unit 3 Part 3 Sentence Structure	2
13	Unit 3 Part 4 The Writing Process	2
14	Unit 4 Prewriting Part 1 Organization	2
15	Unit 4 Part 2 Sentence Structure Part 3 Grammar & Mechanics & Part 4 The Writing Process	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	6	25%
2.	Midterm Exam 2	13	25%
4.	Final exam	16	50%
5.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Technical Report Writing Guidelines: Improve Your Writing of Technical Reports | A Guide to Exceptional Reports | Master the Art of Crafting Impactful Technical Documents (2023) Nayal G. Farouk ISBN-13: 979-8864365335
Supportive References	How To Write Technical Writing: Your Step-By-Step Guide To Writing Technical Writing (2016) HowExpert Press ISBN-10: 1539165965 ISBN-13: 978-1539165965
Electronic Materials	
Other Learning Materials	Lecture Notes

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom with 50 seats**
Technology equipment (projector, smart board, software)	**LCD Projector**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students' assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	

DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title: Engineering Economy	
Course Code: 311-INE-2	
Program: Bachelor in Mechanical Engineering	
Department: Mechanical Engineering	
College: College of Engineering	
Institution: King Khalid University, Abha, Saudi Arabia	
Version: 10	
LastRevision Date: 21 June 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2L + 0 P = 2					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (8^{th} /4^{th})					
4. Course General Description:					
Methods of economic analysis in engineering, including time value of money, equivalence, economic measures of worth, selection rules for alternatives, income taxes and equipment depreciation, inflation, and uncertainty.					
5. Pre-requirements for this course (if any):					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
1. Describe the basic concept of engineering economics 2. Recognize the cost concept used in cost terminology and economies of scale 3. Estimate the time value of money 4. Compare alternatives for decision making 5. Calculate depreciation, trading accounts and general balance schedule, income statements and feasibility study.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
Total		32

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Understand economic decision criteria, present value, IRR, benefit/cost ratio	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.0	Skills			
2.1	Manipulate cash flow to obtain equivalent values	KLO1	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.2	Form alternatives and derive cost/benefit estimates	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.3	Compare alternatives with unequal economic lives	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.4	Perform after tax cash flow, apply depreciation accounting rules M	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.5	Analyze inflation and uncertainty in analysis.	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				Mid Exam Final Exam
2.6	Analyse depreciation plan for machine data using professional ethics and professional responsibility	KLO5	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.7	Design and analysis project management plan	KLO7	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
2.8	Construct project acceptance plan criteria	KLO7	Lectures Discussion Tutorial sheets	Quiz Assignment Mid Exam Final Exam
3.0	**Values, autonomy, and responsibility**			

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the Economy	4
2.	Basics in Engineering Economy	6
3.	Breakeven Analysis	4
4.	Cash flow and equivalence	6
5.	The formulas	6
6.	Depreciation	4
Total		**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	E-learning-based activities (Online Quizzes, Assignments)	Weekly	25%
2.	Midterm Exam 1	6	15%
3.	Midterm Exam 2	11	15%
4.	Group Discussions / Attendance / Participation	Weekly	5%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Basics of Engineering Economy, Blank, Leland T. and Tarquin, Anthony J., 2nd Ed., McGraw-Hill, 7th Ed., 2021, ISBN-. 1260571149, 9781260571141
Supportive References	Engineering Economy, William G. Sullivan. Elin M. Wicks and James Luxhoj,16 th ed., Prentice Hall, 2021, ISBN-13: 978-0-13-343927-4 ISBN-10: 0-13-343927-5
Electronic Materials	Human factor and ergonomics in Manufacturing & Service Industries, Willey Publishers
Other Learning Materials	https://www.youtube.com/

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Lecture room • Backboard facility for sharing lecture notes, • Submission of assignments and attempting Quizzes. • Details of recommended group profiles in the teacher manual
Technology equipment (projector, smart board, software)	• Every student requires access to a personal computer and the Internet. • On-site University access is provided through the University Central Library.
Other equipment (depending on the nature of the specialty)	• Present Planned Resources takes care of the subject's needs.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Studentsassessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023

TP-153

Course Specification

(Bachelor)

Course Title :**Engineering Management**
Course Code: **411-INE-2**
Program:**Bachelor in Mechanical Engineering**
Department:**Mechanical Engineering**
College:**College of Engineering**
Institution:**King Khalid University, Abha, Saudi Arabia**
Version::**V10**
LastRevision Date:**21 June 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
0 L + 6 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (10^{th} /5^{th})					
4. Course General Description:					
This course deals with the methods and modern techniques of engineering management analysis for Formulation, decision making, Strategy Analysis, and Implementation, Leadership and Management of Technical People and Team Building, Financial Analysis.					
5. Pre-requirements for this course (if any)**:**					
NIL					
6. Pre-requirements for this course (if any)**:**					
NIL					
7. Course Main Objective(s):					
• Augmentation of engineering knowledge with advanced understanding of business and management practices. • Understand the importance of management skills to succeed in scientific or engineering enterprise management roles. • Getting introduced to analytical skills to cover the gap between engineering and business management					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours

1.	**Lectures**	
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Understand and distinguish different management functions and skills.	KLO1	Lectures, class discussion, Power point presentation	Class work - home work, and final exams.
...				
2.0	**Skills**			
2.1	Analyze problems that face the management and put them in a form capable of being solved of engineering parts	KLO7	Lectures, class discussion, Power point presentation	Class work, homework, and final exams.
2.2	Employ ethical and professional responsibilities in engineering situations.	KLO7	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate the importance of effective communication by which the organization acquires competitive advantages	KLO7	Lectures, class discussion, Power point presentation	Midterm exams and Final exams
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to management paradigms	2
2.	Management challenges for engineers	6
3.	The functions of engineering management	4
4.	Organizing	4
5.	Leading	4
6.	Controlling	6
7.	Creativity and innovation	4
8.	Ethics	4
9.	Engineering management in the new millennium	2
	Total	30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes, Assignments, Project	After completing some specified topics	35 %
2.	Midterm- 1	7	25 %
12.	Final Exam		40%
13.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	Engineering Management: Meeting the Global Challenges, 3rd Edition Authors: C. M. Chang Publication Year: 2022 Publisher: CRC Press ISBN: 9780367512867
Supportive References	
Electronic Materials	Videos
Other Learning Materials	Blackboard Collaborate Ultra

3. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Three classrooms equipped with 50 seats and 50 drawing tables.
Technology equipment (projector, smart board, software)	Data show and multimedia
Other equipment (depending on the nature of the specialty)	--

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct (through Rubrics)
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

Course Title :Materials Science
Course Code:211-ME-3
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version:10
Last Revision Date:21 June 2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2L + 1 P = 3					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (3rd /2nd)					
4. Course general Description:					
Material science is a core mechanical engineering subject and a prerequisite for engineering student. This course give student the fundamental information about what are inside the material by this wat student can understand different processing of materials such as mechanical testing and also deformation of materials. The conventional method of classroom interaction between the teacher and student is essential for teaching this subject. At the same time, practical experiments are conducted. All these methods are being followed and any improvement in the implementation shall be made as per the feedback of students. The communication between the teacher and student is regularly maintained and learning material is also provided through blackboard to the students.					
5. Pre-requirements for this course (if any)**:**					
129-PHYS-4 Physics-1 **107-CHEM-4 General Chemistry**					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
This course covers and concentrates on principles of material science such as atomic structure and interatomic bounding, crystal structure of materials, theory of diffusion, imperfections in crystals, mechanical testing and evolution of materials, phase diagram and cooling curves of metals and alloys, iron-carbide diagram for steel and cast iron.					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
6.	**Lectures**	30
7.	**Laboratory/Studio**	30
8.	**Field**	
9.	**Tutorial**	
10.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Select theories of diffusion and explain the imperfection of crystals	**KLO1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
1.2	Classify different types of materials types based on their properties	**KLO1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
...				
2.0	**Skills**			
2.1	Analyze the phases and distinguish invariant reactions of phase diagrams	**KLO2**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
2.2	Assess the structure of metals on a macro/micro scale	**KLO3**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment** **Final**
...				
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1				
3.2				
…				

C. Course Content

No	List of Topics	Contact Hours
4.	Introduction	4
5.	Atomic bond	6
3.	Crystal structure	8
4.	Crystals imperfection	6
5.	Atomic diffusion	6
6.	Mechanical properties and behavior	14
7.	Phase diagram Iron-iron carbide diagram	10
8.	Corrosion	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4.	Midterm Exam 1	5-6	15%
5.	Midterm Exam 2	11-12	15%
6.	Quizzes and Assignments	2, 8, 13	20%
4.	Lab	Every week	10%
5.	Final exam		40%
6.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	William D. Callister Jr., David G. Rethwisch, " Materials Science and Engineering", Wiley 10th Edition (2020) ISBN-10: 1119721776 ISBN-13: 978-1119721772
Supportive References	V. Raghavan, Materials Science and Engineering: A First Course 6th Edition, Kindle Edition, PHI Learning (2015) ISBN-13: 978-8120324558 ISBN-10: 8120324552
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	

DATE	

2023

TP-153

Course Specification

(Bachelor)

Course Title :Professional Ethics and Practice
Course Code: 411-GE-2
Program: Bachelor in Mechanical Engineering
Department: Mechanical Engineering
College: College of Engineering
Institution: King Khalid University, Abha, Saudi Arabia
Version:1
Last Revision Date:21 June 2024

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (2)					
2L					
2. Course type					
A.	☐University	■College	☐Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered: (7^{th}/4^{th})					
4. Course General Description:					
The overall aim of this course is to introduce the concepts, theory and practice of engineering professionalism and ethics. It will allow to understand the moral problems faced in the corporate setting and wider philosophical frameworks along with social importance and their intellectual challenges are given its due placement. It is important that students have to be not only technically competent, but socially accountable in their careers. Hence, this course expect them to learn to share ideas and concepts, working in teams on majority of the case studies to have enough sensitivity to engineering professionalism.					
5. Pre-requirements for this course (if any):					
-					
6. Pre-requirements for this course (if any):					
7. Course Main Objective(s):					
This course provides students with experiences and knowledge related to the ethics and practice of the profession, behavioral values in dealing, duties, and rights while practicing the profession					

2. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the ethical values of practicing the profession and the rules of behavior	**PLO1.4**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Midterm** **Assignment**
2.0	**Skills**			
2.1				
3.0	**Values, autonomy, and responsibility**			
3.1	Show the rights and duties in the practice of the profession	**PLO3.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**
3.2	Demonstrate problems and how to find solutions while practicing the profession	**PLO3.1**	**Lectures** **Tutorials** **Lab**	**Quizzes** **Lab** **Midterm** **Assignment**

C. Course Content

No	List of Topics	Contact Hours
1.	The concept of professional ethics and the definition of engineering practice	4
2.	Regulation of Saudi Council of Engineers for Ethics and Professional Practice	7
3.	Rules of Practice and Professional Obligations (NSPE Code)	7
4.	Environmental Ethics	6

5.	Intellectual Property and Computer Ethics	6
	Total	**30**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam 1	7-8	15%
2.	Midterm Exam 2	15-16	15%
3.	Quizzes, and Assignments	2, 8, 15	30%
4.	Final exam	16-17	40%
5.	Total		100%
6.			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	1- Ethics in Engineering Practice and Research (2011) Caroline Whitbeck ISBN-10: 0521897971 ISBN-13: 978-0521897976 2- Professional Ethics in Engineering (2021) P Elamurugan ISBN-10: 1638324034 ISBN-13: 978-1638324034 3- Engineering Ethics: Concepts and Cases (2018) Charles Harris Jr et al. ISBN-10: 1337554502 ISBN-13: 978-1337554503
Supportive References	1. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Thompson Learning, 2000. 2. Harris Jr., C.E. , Pritchard, M.S., Rabins, M.J., Engineering Ethics Concept and Cases: 4th edition (California: Wadsworth Cengage Learning, 2009)
Electronic Materials	Videos by instructor
Other Learning Materials	**Nil**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 45 seats Laboratory with 20 seats
Technology equipment (projector, smart board, software)	LCD Projector Multimedia teaching aids speakers
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and faculty	Indirect through surveys
Effectiveness of Students assessment	Student and faculty	Indirect through surveys
Quality of learning resources	Student and faculty	Indirect through surveys (Student, faculty)
The extent to which CLOs have been achieved	Quality Committee	Direct through Rubrics
Other		

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Engineering Entrepreneurship**
Course Code:	**511-GE-2**
Program:	**Bachelor in Mechanical Engineering**
Department:	**Mechanical Engineering**
College:	**College of Engineering**
Institution:	**King Khalid University, Abha, Saudi Arabia**
Version:	**V10**
LastRevision Date:	**21 June 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:(2)					
2L = 2					
2. Course type					
A.	☐University	☐College	■Department	☐Track	☐Others
B.	■Required		☐Elective		
3. Level/year at which this course is offered:(9th/5th)					

4. Course General Description:

Engineering Entrepreneurship introduces engineering students to the concepts and practices of technology entrepreneurial thinking and entrepreneurship. It explores all aspects of the creation of a new venture from idea through startup, growth, and beyond.
This course aims to make the students to

- Gain knowledge of the context, concepts, process, types, and importance of entrepreneurship
- Focus on creativity, Innovation, and intellectual property rights.
- Develop an insight into how entrepreneurs conceive, adapt, and execute strategies to create new, successful businesses.

5. Pre-requirements for this course (if any):

NIL

6. Pre-requirements for this course (if any):

NIL

7. Course Main Objective(s):

This course aims to provide the background necessary to understand the entrepreneurial approach to business and the tools required to function effectively in the competitive entrepreneurial environment. At the end of this course, the students should be able to:

- Explain and analyze the entrepreneurial process from generating creative ideas to exploring feasibility to creating an enterprise for implementing the ideas.
- Experience the dynamics of participating on a business team and the power inherent in a team relative to individual effort.
- Create and present a business plan for a technology idea.
- Provide the background, tools, and life skills to participate in the entrepreneurial process within a large company, in a new venture, or as an investor.

2. Teaching mode

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distancelearning		

3. Contact Hours(based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
2.0	Skills			
2.1	Apply the principles of entrepreneurship	PLO2.1	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.2	Apply the theories of entrepreneurship to launch a venture	PLO2.6	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.3	Interpret real-life situations for setting up an enterprise	PLO2.6	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.4	Practice Motivational Theories	PLO2.2	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
2.5	Execute multiple factors to solve entrepreneurship problems	PLO 2.5	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate Business Ethics and values	PLO 3.1	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets
3.2	Use E resources for Entrepreneurship	PLO3.3	Lectures E-learning Tutorials	Assignments Mid and Final Tutorials sheets

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the course 511GE-3	2
2.	Introduction to entrepreneurship, entrepreneur, importance	2
3	Creativity and innovation	2
4	Need for innovation and value addition	3
5	Entrepreneurial values and attitude	3
6	Motivation and achievement	1
7	Entrepreneurial opportunities	2
8	Setting up and enterprise	1
9	Resource mobilization	2
10	MSME and entrepreneurial ecosystem	3
11	Business plan and strategies	2
12	Business incubation	2
13	Launching, growing, and ending the new venture	2
14	Revision	3
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Mini project [oral presentation]	2, 6	5
2.	Assignments/Quizzes/Conceptual Tests	Every Week	20
3.	Mid Examination [Written test]	9	30
4	Group Discussion	7	5
5	Final Examination		40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1.References and Learning Resources

Essential References	• The Art of the Start: The time-tested, battle-hardened guide for anyone starting anything, Kawasaki, Guy; ISBN: 1591840562, Portfolio – a member of Penguin Group; 2004.
Supportive References	• Technology Ventures: From Idea to Enterprise, Dorf, Richard, Byers, Thomas, and Nelson, Andrew; ISBN 978-0073380186; 3rd Edition, 2009. • NewVentureCreation,6thEditionor5thEdition,Timmons,JeffryA;ISBN: 0072498404,January2004. • Monk & the Riddle, Komisar, Randy; ISBN: 1578516447, Harvard BusinessSchool Press; September 2001.
Electronic Materials	• Significant YouTube Video(s) URL will be shared in the Blackboard
Other Learning Materials	

3. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classroom with 50 seats
Technology equipment (projector, smart board, software)	• Laptop / Computer system • Multimedia teaching aids – LCD Projector speakers

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect (through course evaluation survey)
Effectiveness of students assessment	Faculty and Quality Committee	Direct (through Rubrics)
Quality of learning resources	Students and faculty	Indirect (through university experience and mission-vision-PEO surveys)
The extent to which CLOs have been achieved	Quality Committee	Direct (through Rubrics)

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

Assessment Methods(Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Reviewed by Curriculum Committee Approved by Quality Committee
REFERENCE NO.	
DATE	20-08-2023

2023

TP-153

Course Specification

(Bachelor)

Course Title:	Electrical Engineering 1
Course Code:	218-EE-3
Program:	
Department:	Electrical Engineering
College:	College of Engineering
Institution:	King Khalid University
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (5th /3rd)					
4. Course General Description:					
This course covers the fundamental knowledge of the electric circuit, introduces Basic concepts, components of Electric Circuits, and explains the methodologies used to solve electrical circuits. The course provides a detailed coverage of the various topics such as Ohm's law & Kirchhoff's laws, Resistance, Inductors, Capacitors, and battery combinations, Techniques for solving DC electric circuits, and AC Steady-state Analysis.					
5. Pre-requirements for this course (if any)**:**					
119-MATH-3 , 129-PHYS-4					
6. Co-requisites for this course (if any)**:**					
7. Course Main Objective(s):					
This course provides the basic concepts and theories for the analysis of electrical circuits. It offers an understanding of the methodologies used to solve electrical circuits and has expertise in the study of electrical circuits. Use Kirchhoff's laws, circuit theorems, and node voltage methodology to solve DC and AC circuits and demonstrate a basic understanding of batteries, Resistors, Inductors, and Capacitors and its connections.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	36

2.	**Laboratory/Studio**	24
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Identify the basic concepts, components of electric circuits, and Ohm's & Kirchhoff's laws	KLO1	Classroom Laboratory Experiment Videos Discussions Self-learning	Major Exam Assignments Quizzes Lab Work Final Exam
2.0	**Skills**			
2.1	Analyze the current using various DC theorems	KLO2	Classroom teaching Laboratory Experiments Discussions/Presentation	Major Exam Assignments Quizzes Lab Work Final Exam
2.2	Analyze DC networks by applying various laws and theorems	KLO2		
2.3	Demonstrate basic proficiency in building basic electrical circuits and operating fundamental electrical engineering equipment	KLO4		
2.4	Analyze the sinusoidal electrical quantities mathematically as well as graphically in the form of waveforms/phasors, and analyze the AC circuits to determine the unknown quantities.	KLO1		
2.5	Connect and analyze Series and Parallel Connection of Resistors, Inductors, Capacitors, and Batteries	KLO3		
3.0	**Values, autonomy, and responsibility**			
3.1				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction - SI units, basic concepts of charge, current, voltage, electrical active and passive elements, power, energy, electrical sources-independent and dependent voltage, and current sources.	5
2.	Fundamental concepts of electrical circuits-Ohm's Law, series and parallel circuits, node, loop, branch, mesh.	5
3.	Kirchhoff's current and voltage law, the concept of open circuit, and short circuit.	5
4.	VDR on No-Load operation, VDR under Load	4
5.	Star-delta transformations.	4
6.	Nodal analysis.	4
7.	Mesh analysis.	4
8.	Source transformation, superposition theorem	4
9.	Thevenin's theorem, Norton's theorem, maximum power transfer theorem.	3
10.	Series and parallel connection of Batteries.	4
11.	Determining the Internal Resistance of batteries connected in series and Parallel	4
12.	'j' operator, rectangular and polar coordinates- periodic and non-periodic waveforms-instantaneous, peak, average, and rms values-ac circuit configurations, phase angle,	5
13.	Inductors and Capacitors	
14.	Phasor diagram.	5
15.	Power factor-apparent, active, and reactive power	4
Total		**60**

D. Students' Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments and (or) HomeWorks and (or) Mini-Projects	4, 6, 10	20%
2.	Quizzes	5, 7, 9, 11	20%
3.	Midterm	8, 13	20%
4.	Lab work	----	
5.	Final Exam		40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Basic Engineering Circuit Analysis, J. D. Irwin, 12th edition, Macmillan, 2020
Supportive References	1. Engineering Circuit Analysis (6th), 2002, W. H. Hayt, J.E. Kemmerly, and S. Durbin. 2. Electronic Devices and Circuit Theory (7th) by R. Boylestad and L. Nashelsky. 2016

Electronic Materials	1. Lecture handouts, Videos 2. https://www.youtube.com/watch?v=ObOXn4WMDSk&list=PL08ef9eJxtJYb2TBy0jOuzQIo1TzsL0u9
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms Laboratory
Technology equipment (projector, smart board, software)	Multimedia teaching aids-Projector, Speakers
Other equipment (depending on the nature of the specialty)	Hardware equipment designed as per the course

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Course Evaluation Survey (indirect)
Effectiveness of Students assessment	Faculty	CLO analysis(direct)
Quality of learning resources	Students	Survey on Learning Resources (indirect)
The extent to which CLOs have been achieved	Faculty, Quality Committee	CLO analysis (direct), Course Report, and PLO analysis (direct) by Quality Committee
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	REVIEW BY CURRICULUM COMMITTEE APPROVAL BY QUALITY COMMITTEE
REFERENCE NO.	EE/CS/EE2301/2024
DATE	2024

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Electrical Engineering 2
Course Code:	328-EE-3
Program:	
Department:	Electrical Engineering
College:	College of Engineering
Institution:	King Khalid University
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	
3. Level/year at which this course is offered: (6th /3rd)					
4. Course General Description:					
This course covers the concepts, principles of operation, performance characteristics and methods of control of the induction motors, DC motors, fractional horse-power motors, and different types of electrical motors This course introduces the basic knowledge of Electrical Machines (DC and AC). Topics include the basics of the magnetic (principle of generation), Discuss the different types of transformers, List transformer symbols and formulas, know how DC machine works, the Use the equivalent circuit of DC Motors to investigate it, Know how AC machine works and Can determine the equivalent circuit parameter from tests					
5. Pre-requirements for this course (if any):					
218-EE-3					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
This course introduces the basic knowledge of Electrical Machines (DC and AC). Topics include how to Learn the basics of the magnetic (principle of generation), discuss the different types of transformers, List transformer symbols and formulas, know how DC machine works, Use the equivalent circuit of DC Motors to investigate it, know how AC machine works, and can determine the equivalent circuit parameter from tests					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	36
2.	**Laboratory/Studio**	24
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define basic concepts of the principle of operation of the electric DC & AC machines, their types, construction, and the principle of working.	KLO1	Classroom Laboratory Experiment Videos Discussions Self-learning	Major Exam Assignments Quizzes Lab Work Final Exam
1.2	Understanding of the construction, connections, and principle of operation of single-phase and three-phase induction motor.	KLO1	Classroom Laboratory Experiment Videos Discussions Self-learning	Major Exam Assignments Quizzes Lab Work Final Exam
2.0	**Skills**			
2.1	Analyze and differentiate between types of machines.	KLO1	Classroom teaching Laboratory Experiments Discussions/Presentation	Major Exam Assignments Quizzes Lab Work Final Exam
2.2	Analyze DC and AC networks by applying various laws and theorems	KLO2		
3.0	**Values, autonomy, and responsibility**			
3.1	Apply the suitable machine for the application.	KLO9	Classroom teaching Laboratory Experiments Discussions/Presentation	Major Exam Assignments Quizzes Lab Work Final Exam

C. Course Content

No	List of Topics	Contact Hours
1.	Magnetic Circuits: Magnetic circuit definition, Magnetic circuit concept and analogy, Magnetization curves of ferromagnetic materials, Magnetic circuit losses	**12**
2.	Transformers: Introduction and construction, Theory of operation, Equivalent circuit, Equivalent circuit parameter determination from tests, Voltage regulation and efficiency	12
3.	Direct Current (DC) Machines: Introduction and construction, Generation of unidirectional voltage, Inducted EMF equation, DC machines classification, Equivalent circuit of DC generator, DC generator characteristics, Equivalent circuit of Dc Motor, DC Motor characteristics	**12**
4.	AC Machines: Introduction and construction, Three-phase Induction Motors, Equivalent circuit and performance calculation, Power and torque calculation, Torque-Speed characteristics	12
5.	Synchronous Machines: Introduction and construction, Generation EMF equation, Equivalent circuit, Equivalent circuit parameter determination from tests	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments and (or) HomeWorks and (or) Mini-Projects	4, 6, 10	20%
2.	Quizzes	5, 7, 9, 11	20%
3.	Midterm	8, 13	20%
4.	Lab work	----	
5.	Final Exam	15	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	'Electric Machinery - fitzgerald , McGraw-Hill S. J. Chapman, "Electric Machinery Fundamentals", McGraw Hill
Supportive References	1. Electrical Machines -S. K. Sahdev. CAMBRIDGE UNIVERSITY PRESS 2. D P KOTHARI and I J NAGRATH, Basic Electrical Engineering, Second Edition'. 3. ALLAN R. HAMBLEY, Electrical Engineering principles and Applications, Fourth Edition'.
Electronic Materials	1. Lecture handouts, Videos 2. https://www.youtube.com/watch?v=ObOXn4WMDSk&list=PL08ef9eJxtJYb2TBy0jOuzQIo1TzsL0u9

Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms Laboratory
Technology equipment (projector, smart board, software)	Multimedia teaching aids-Projector, Speakers
Other equipment (depending on the nature of the specialty)	Hardware equipment designed as per the course

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	course evaluation Survey (indirect)
Effectiveness of Students assessment	Faculty	CLO analysis(direct)
Quality of learning resources	Students	Survey on Learning resources (indirect)
The extent to which CLOs have been achieved	Faculty, Quality committee	CLO analysis (direct), Course Report and PLO analysis (direct) by Quality Committee
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	REVIEW BY CURRICULUM COMMITTEE APPROVAL BY QUALITY COMMITTEE
REFERENCE NO.	EE/CS/EE2304/2024
DATE	2024