Course Specifications

Course Title:	**Thermodynamics-II**
Course Code:	**ME252**
Program:	**Mechanical Engineering (UG)**
Department:	**Mechanical & Industrial Engineering**
College:	**College of Engineering**
Institution:	**Majmaah University**

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A. Course Identification

1. Credit hours:02	

2. Course type

a.   University ☐   College ☐   Department √   Others ☐

b.   Required ☐   Elective ☐

3. Level/year at which this course is offered: 06/2019-20

4. Pre-requisites for this course (if any)**: ME231**

5. Co-requisites for this course (if any)**: Nil**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	35	80
2	Blended	05	10
3	E-learning	05	10
4	Correspondence	0	0
5	Other	0	0

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	0
3	Tutorial	15
4	Others (specify)	0
	Total	45
Other Learning Hours*		
1	Study	30
2	Assignments	05
3	Library	05
4	Projects/Research Essays/Theses	--
5	Others (specify)	05
	Total	45

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

Irreversibility and availability, Thermodynamic property Relations, Mixtures and solutions, Chemical reactions and combustion, Phase and Chemical equilibrium, Thermodynamics of compressible flow, Applications using computer.

2. Course Main Objective

1. An understanding of the definition, necessary background and importance of the subject of thermodynamics.

2. Students are able to understand thermodynamics principle and system, devices and able to work on the systems related to this course.

3.Use the techniques, skills, and modern engineering tools necessary for engineering practice.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	Memorize the thermodynamics devices and systems.	a
1.2	Describe the model engineering problems and the working principle of thermodynamics.	e
1.3	Memorize the process and applications and solve the numerical problems.	a
1.4	Recall the thermodynamics relations, characteristics and their applications.	e
2	**Skills :**	
2.1	Explain the results of the numerical problems.	a
2.3	Calculate the numerical values of questions and use computer application in solving problems.	e
3	**Competence:**	
3.1	Demonstrate and share with classmates and teachers, help of internet for solving problems	a
3.2	Work with teams to appraise the issues	e

C. Course Content

No	List of Topics	Contact Hours
1	Irreversibility and availability	6
2	Thermodynamic property Relations.	6
3	Mixtures and solutions.	6
4	Chemical reactions and combustion.	9
5	Phase and Chemical equilibrium.	6
6	Thermodynamics of compressible flow.	6
7	Applications using computer.	6
Total		45

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	Memorize the thermodynamics devices and systems.	Lectures, tutorials and independent study assignments	Home assignments and Quizzes. Midterms and Final Exam
1.2	Describe the model engineering problems and the working principle of thermodynamics.	Lectures, tutorials and independent study assignments, Power point	Home assignments and Quizzes.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		presentation on different topic related to this subject.	Midterms and Final Exam.
1.3	Memorize the process and applications, and solve the numerical problems.	Derivations, formulae, use of principle of various system and devices, solving the numerical based problems..	Mid Term/Quiz/Final Exam Home assignments and Quizzes. Midterms and Final Exam.
1.4	Recall the thermodynamics relations, and their applications.	Lectures, tutorials and study materials.	Home assignments and Quizzes. Midterms and Final Exam.
2.0	**Skills**		
2.1	Explain the results of the numerical problems.	Class lectures, Tutorials, Home Assignments.	Class participation, Home assignments and Quizzes. Midterms and Final Exam.
2.2	Differentiate the mathematical equations use in system design.	Class lectures, Tutorials, Home assignments. Group discussions.	Home assignments and Quizzes. Midterms and Final Exam, Black Board submission.
2.3	Calculate the numerical values of questions and use computer application in solving problems.	Class lectures, Tutorials, Home assignments. Group discussions	Home assignments and Quizzes. Midterms and Final Exam, Black board submission
2.4	Participating in-group discussions.	Special Lectures on this topic.	Group discussion and Exams.
3.0	**Competence**		
3.1	Demonstrate and share with classmates and teachers, help of internet for solving problems.	Making the teaching learning two-way communication. Getting students involved to solve problems and asking students did they understand the concept clearly.	Assignments, Term Exams and Final Exam
3.2	Work with teams to appraise the issues	Assignments without direct input, but let them calculate	Assignments, Term Exams and

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		inputs from source data	Final Exam

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1,2,3	03,10,15	05
2	Assignment/Homework	05,07,12	10
3	Mid Term 1	07	20
5	Mid Term 2	11	20
6	Activity	3,7,12,15	05
7	Final Exam	15	40
			100

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

E. Student Academic Counseling and Support

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

Lecture hours as given in Time Tables : Monday 1.00 p.m.-2.50 p.m.

           Tutorial Tuesday 2.00 p.m. – 2.50 p.m.

           (Class Rooms E07 and E07)

Office hours: : 10 AM -12 Noon Sunday

           (Office location 044-02-17)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	- Th by Harry A. Sorensen, (Washington State University) Jhon Wiley and Sons - Van Wylen , G.J. and Sonntag, R.E. Fundamentals of Classical Thermodynamics, SI, Version, Jhon Wiley & Sons, Inc, New Yark,1976.
Essential References Materials	P.K Nag, Basics and Applied Thermodynamics, Tata McGraw Hill.
Electronic Materials	- Black Board chapters are available on site for self-study of the students. - Black Board Quiz and Question bank - http://www.thermodynamics.net/courses
Other Learning Materials	- MS Excel - Thermodynamics software - Com Sol or Fluent

2. Facilities Required

Item	Resources

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class Rooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart board is provided
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• - Interactive learning in the class. • Course evaluation questionnaire. • All students who attend the course fill forms.

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students	Indirect Assessment
CLOs achievement	Faculty	Direct/Indirect Assessments
Learning Resources	Students	Indirect Assessment
Course Contents	Students	Indirect Assessment

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

H. Specification Approval Data

Council / Committee	Department Council
Reference No.	**1/34/9767**
Date	**25/02/1432 H**