



# Course Specifications

<b>Course Title:</b>	<b>Turbomachines</b>
<b>Course Code:</b>	<b>ME458</b>
<b>Program:</b>	<b>Mechanical Engineering (UG)</b>
<b>Department:</b>	<b>Mechanical &amp; Industrial Engineering</b>
<b>College:</b>	<b>College of Engineering</b>
<b>Institution:</b>	<b>Majmaah University</b>

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## A. Course Identification

<b>1. Credit hours:03</b>
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered: 09/2019-20</b>
<b>4. Pre-requisites for this course (if any): ME356</b>
<b>5. Co-requisites for this course (if any): Nil</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	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
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	0
3	Tutorial	15
4	Others (specify)	0
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	30
2	Assignments	10
3	Library	10
4	Projects/Research Essays/Theses	05
5	Others (specify)	5
	<b>Total</b>	<b>60</b>

\* 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

<b>1. Course Description</b> Fluid mechanics and energy transfer in turbo – machines. Centrifugal and axial compressors. Centrifugal and axial flow turbines. Applications, including industrial gas turbine engines and aircraft engines. aircraft engines.
<b>2. Course Main Objective</b>
1. To understand the definition, necessary background and importance of the subject of Turbo Machines.

2. To understand fluid mechanics and energy transfer in turbo machines,
3. To understand working principles of centrifugal and axial compressors and turbines,

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.1	Memorize the Fluid and Turbomachines devices and systems.	a
1.2	Describe the model engineering problems and the working principle of Turbomachines.	e
1.3	Memorize the process and applications, Turbomachines and solve the numerical problems.	a
1.4	Recall the turbomachine design, characteristics and their applications.	e
<b>2</b>	<b>Skills :</b>	
2.1	Explain the results of the numerical problems.	a
2.2	Differentiate the mathematical equations use in system design.	e
2.3	Calculate the numerical values of questions and use computer application in solving problems.	e
<b>3</b>	<b>Competence:</b>	
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	Fluid mechanics and energy transfer in turbo – machines..	8
2	Centrifugal and axial compressors	12
3	Centrifugal and axial flow turbines.	16
4	Applications, including industrial gas turbine engines and aircraft engines.	16
5	aircraft engines.	8
<b>Total</b>		<b>60</b>

### D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Memorize the Fluid and Turbomachines 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 Turbomachines.	Lectures, tutorials and independent study assignments, Power point presentation on different topic related to this subject.	Home assignments and Quizzes. Midterms and Final Exam.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Memorize the process and applications, Turbomachines 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 turbomachine design, characteristics and their applications.	Lectures, tutorials and study materials.	Home assignments and Quizzes. Midterms and Final Exam.
<b>2.0</b>	<b>Skills</b>		
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.
<b>3.0</b>	<b>Competence</b>		
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 inputs from source data	Assignments, Term Exams and 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	05,12	10
3	Mid Term 1	07	20
5	Mid Term2	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 8.00 a.m.-10.00 a.m., Tuesday 12.00 to 1.00  
 Tutorial Tuesday 1.00 p.m. - 1:50 p.m.  
 (Class Rooms A01 and E02)

Office hours : : 10 AM -12 Noon Tuesday  
 (Office location 044-02-17)

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<ul style="list-style-type: none"> <li>Fluid Mechanics and Thermodynamics of Turbo machinery, S.L. Dixon, Pergamon Press.</li> </ul>
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>Basic Concepts in Turbomachinery By G. Ingram, 2009, Ventus Publishing ApS</li> </ul>
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>Black Board chapters are available on site for self-study of the students.</li> <li>Black Board Quiz and Question bank</li> <li><a href="http://www.turbomachine.net/courses">http://www.turbomachine.net/courses</a></li> </ul>
<b>Other Learning Materials</b>	<ul style="list-style-type: none"> <li>MS Excel</li> <li>Fluid software</li> <li>Com Sol or Fluent</li> </ul>

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Class Rooms
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Smart board is provided
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or	<ul style="list-style-type: none"> <li>- Interactive learning in the class.</li> <li>• Course evaluation questionnaire.</li> </ul>

Item	Resources
attach a list)	<ul style="list-style-type: none"> <li>All students who attend the course fill forms.</li> </ul>

### 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.	<b>1/34/9767</b>
Date	<b>25/02/1432 H</b>