Department of Mechanics and Aerospace Engineering

Program of Theoretical and Applied Mechanics for Class 2018

I. Introduction

Theoretical and Applied Mechanics (TAM) is a basic while highly practical scientific discipline with long history, rapid development, and widespread applications. Its strong technical implications make TAM the foundation for many industries and various engineering areas such as aerospace engineering, ocean engineering, manufacturing, civil engineering, and astromechanics. Therefore, students with TAM training often become leaders with a holistic view of technology.

II. Objectives

Students majored in TAM will be equipped with necessary theory, knowledge and skills to become senior specialists for research, education, R&D and management in mechanics and related areas.

III. Study Length and Degree Requirements

Study length: 4 years

Degree conferred: Bachelor of Science.

The minimum credit requirement for graduation: 134 credits (not including English courses)

IV. Discipline

Theoretical and Applied Mechanics

V. Main Courses

Theoretical Mechanics I, Theoretical Mechanics II, Strength of Materials, Fluid Mechanics, Elasticity, Experimental Mechanics, Computational Mechanics

VI. Practice-Based Courses

Including: Research and Innovation Projects, Metalworking Practices, Summer Internship, Degree Thesis (or Design)

VII. Course components and minimum credit requirement

General Education (GE) Required Courses: 51 credits (not including English courses)

General Education (GE) Elective Courses: 10 credits

Major Foundational Courses: 21 credits

Major Core Courses: 20 credits

Major Elective Courses: 15 credits

Research and Innovation Projects: 2 credits

Metalworking practices (Awareness Practice of Manufacturing Engineering): 3 credits

Summer internship: 4 credits

Degree Thesis (or Design): 8 credits

The minimum credit requirement for graduation: 134 credits (not including English courses)

VIII. Requirements for Science Module of GE Required Courses

Course Cod	Course Name	Credit	Lab Credits	Hours/week	Term	Instruction Language	Prerequisite	Dept
MA101B	Calculus I A	4		4	Spr/Fall	B/E		MATH
MA102B	Calculus II A	4		4	Spr/Fall	B/E	MA101B	
MA103A	Linear Algebra I-A	4		4	Spr/Fall	B/E		MATH
PHY103B	General Physics B (I)	4		4	Spr/Fall	B/E		PHY
PHY105B	General Physics B (II)	4		4	Spr/Fall	B/E	PHY103B	
CH101B	General Chemistry B	3		3	Spr/Fall	B/E		CHEM
CS102B	Introduction to Computer Programming B	3	1	4	Spr/Fall	B/E		CSE
BIO102B	Introduction to Life Science	3		3	Spr/Fall	B/E		BIO
PHY104B	Experiments of Fundamental Physics	2	2	4	Spr/Fall	B/E		PHY
Total		**31**	**3**	**34**				

IX. Pre-requisites for Major Declaration

Course Code	Course Name	Notes
MA102B	Calculus II A	
MA103A	Linear Algebra I-A	
PHY105B	General Physics B (II)	

X. Course Arrangement

Table 1: Major Required Courses (Foundational and Core Courses)

Course Category	Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the course	Instruction language	Prerequisite	Dept.
Major Foundational Courses	ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/ Spr/ Sum	1/Spr	B	NA	MATH
	MA104b	Linear Algebra II	4		4	Fall/ Spr	1/Spr	B	MA103A	MATH
	PHY203-15	Mathematical Methods in Physics	4		4	Fall	2/Fall	C	MA102B PHY105B MA103A	PHY
	MAE203	Theoretical Mechanics I	3		3	Fall	2/Fall	C	MA104b MA102B	
	MA212	Probability and Statistics	3		3	Fall/ Spr	2/Fall	B	MA102C	MATH
	MA201b	Ordinary Differential Equation B	4		4	Fall/ Spr	2/Spr	B	MA102C	MATH
	Total		**21**	**1.5**	**22.5**					
Major Core Courses	MAE202	Mechanics of Materials	3		3	Spr	2/Spr	B	MA103A MA102B	
	MAE204	Theoretical Mechanics II*	3		3	Spr	2/Spr	B	MA103A MA102B	
	MAE303	Fluid Mechanics	4		4	Fall	3/Fall	E	MA102B PHY105B	
	MAE304	Elasticity	4		4	Spr	3/Spr	C	MAE203 MAE202	
	MAE302-16	Fluid Mechanics Lab	3	3	6	Spr	3/Spr	C	MAE303	
	MAE401-16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	C	MAE202	
	Total		**20**	**6**	**26**					
Practice-Based Courses	MAE499	Research and Innovation Projects	2	2	4	Fall/Spr	4/Fall	C	NA	
	ME103	Awareness Practice of Manufacturing Engineering (Metalworking Practices)	3	2	5	Fall/Spr /Sum	1/Fall -- 4/Fall	B	NA	MEE
	MAE480	Sum Internship	4	4		Sum	3/Sum	C	NA	
	MAE490	Degree Thesis (or Design)	8	8		Spr	4/Spr		NA	
Total			**17**	**16**						

*Note: “Theoretical Mechanics II” can be replaced by “Analytical Mechanics”.

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the course	Instruction language	Prerequisite	Dept.
MAE498	Research and Innovation Projects of Mechanics and Aerospace Engineering	2	2		Fall/Spr	2/Fall -- 4/Fall	C	NA	
MAE205	Introduction to Aeronautics and Mechanics	2		2	Fall/Spr	2/Fall	C	NA	
MAE305	Engineering Thermodynamics	3		3	Fall	2/Fall	B	MA102B	
MAE206	Introduction to Aircraft Engines	1		1	Fall	2/Fall	C	NA	
MAE208	Lectures on selected Engineering Software	2		2	Fall/Spr	2/Spr	C	NA	
MAE210	Engineering Materials	3		3	Spr	2/Spr	C	NA	
MAE405	Aerodynamics	3		3	Fall	3/Fall	B	MA102B	
MAE309	General Principles of Transport Phenomena	3		3	Fall	3/Fall	E	MA102B	
MAE312	Aircraft Flight Dynamics	3		3	Fall	3/Fall	E	MA102B	
MAE307	Aircraft Structural Strength	3		3	Fall	3/Fall	B	MAE202	
MAE313	Aero Engine Structure and Strength	3	1	4	Fall	3/Fall	E	NA	
MAE314	Advanced Numerical Methods	3		3	Spr	3/Spr	B	MA102B	
MAE318	Theory of Vibration	3		3	Spr	3/Spr	E	MAE203B MA201b	
MAE403	Computational Fluid Dynamics	3		3	Spr	3/Spr	E	MAE207 OR MAE303	
MAE409	Finite Element Method	3		3	Spr	3/Spr	B	MAE202	
MAE308	Heat Transfer	3		3	Spr	3/Spr	E	MA102B	
MAE407	Jet and Propulsion	3		3	Spr	3/Spr	E	MAE305 OR PHY204	
MAE417	Aircraft Design Group Practice	3	2	5	Fall	4/Fall	B	NA	
MAE413	Mechanics of Composite Materials	3		3	Fall	4/Fall	B	MA102B	
MAE419	Aerodynamic analysis and design of aircraft	2		2	Fall	4/Fall	C	MAE403	
MAE311	Principles of Turbomachinery	3		3	Fall	4/Fall	C	NA	
EE104	Fundamentals of Electric Circuits	2		2	Spr	1/Spr	B	MA103B MA101B	EEE
CS205	C/C++ Programming Design	3	1	4	Spr	1/Spr	C	NA	CSE
CS203B	Data Structures and Algorithm Analysis B	3	1	4	Fall	2/Fall	B	CS102A	CSE
MA303	Partial Differential Equations	3		3	Fall	3/Fall	B	MA201b	MATH
ME303	Fundamentals of Machine Design	3		3	Fall/ Spr	3/Fall	B	ME102 MAE203B MAE202	MEE
ME307	Fundamentals of Control Engineering	3	1	4	Fall/Spr	3/Fall	B	EE104 MA201b	MEE

ME306	Fundamentals of Robotics	3	1	4	Fall/Spr	3/Spr	B	ME303 ME307	MEE
ME310	Fundamentals of Measurement Technology	3		3	Spr	3/Spr	B	ME307 EE205	MEE
PHYS001	Open Physics Laboratory I	1	1	2	Sum	1/Sum	B	NA	PHY
PHY221	Open Physics Laboratory II	1	1	2	Fall	2/Fall	B	NA	PHY
PHY201-15	Physics Laboratory II	2	2	4	Fall	2/Fall	B	PHY103B	PHY
PHY202	Physics Laboratory III	2	2	4	Spr	2/Spr	B	PHY103B	PHY
PHY207-15	Electrodynamics I	3		3	Fall	2/Fall	C	PHY203-15	PHY
PHY206-15	Introduction to Quantum Mechanics	3		3	Spr	2/Spr	C	PHY203-15 PHY205-15	PHY
PHY425	Modern Techniques in Materials Characterization	3	1	4	Fall	4/Fall	B	PHY206-15	PHY
Total		**95**	**16**	**111**					

Note 1:
A minimum of 15 credits must be obtained from the above courses and a minimum of 9 credits from the MAE courses.

Note 2:
You must be enrolled in at least one (1) of "Computational Fluid Dynamics" and "Finite Element Method".

Note 3:
For those enrolled with a Fluid Mechanics direction:
You must be enrolled in at least one (1) course from "Engineering Thermodynamics", "Aerodynamics" and "Heat Transfer".

For those enrolled with a Solid Mechanics direction:
You must be enrolled in at least one (1) course from "Theory of Vibration" and "Mechanics of Composite Materials".

Note 4:
“Engineering Thermodynamics” can be replaced by “Thermodynamics and Statistical Physics I”.

Table 3: Overview of Practice-Based Courses

Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the course	Instruction language	Prerequisite	Dept.
ME102	CAD and Engineering Drawing	3	1.5	4.5	Fall/Spr/ Sum	1/Spr	B	NA	MEE
MAE302 -16	Fluid Mechanics Lab	3	3	6	Spr	3/Spr	C	MAE303	
MAE401 -16	Solid Mechanics Lab	3	3	6	Fall	3/Fall	C	MAE202	
MAE499	Research and Innovation Projects	2	2	4	Fall/Spr	4/Fall	C	NA	
ME103	Awareness Practice of Manufacturing Engineering (Metalworking Practices)	3	2	5	Fall/Spr/ Sum	1/Fall -- 4/Fall	B	NA	MEE
MAE480	Sum Internship	4	4		Sum	3/Sum	C	NA	
MAE490	Degree Thesis(or Design)	8	8		Spr	4/Spr		NA	
Total		**26**	**24.5**						

Table 4: Overview of Course Hours and Credits

Course Category	Total Course Hours	Total Credits	Credit Requirements
General Education (GE) Required Courses (not including English courses)	928	51	51
General Education (GE) Elective Courses			10
Major Foundational Courses	360	21	21
Major Core Courses	416	20	20
Major Elective Courses	1776	95	15
Research Projects, Internship and Undergraduate Thesis/Projects	544	17	17
Total (not including English courses)	4024	204	134

Curriculum Structure of Theoretical and Applied Mechanics

