Department of Mechanics and Aerospace Engineering

Program of Theoretical and Applied Mechanics for Class 2018

(For students to declare major at the end of the second semester)

I. Introduction

Southern University of Science and Technology is known as a rising university with the ambition to experiment higher education reform in China. The university focuses on education and research in science and engineering, supplemented by a unique program in humanities and management. We offer education programs at undergraduate, master's and doctoral levels, and draw experiences from world-class universities in building an international, innovative and world-class research-oriented university. Based on the critical strategic needs of the country and of the education programs in engineering of the university, the Department of Mechanics and AeroSpace Engineering was established in December 2015. At present, our department has recruited a group of well-known scholars and young talents from home and abroad to form an international faculty body with complementary knowledge structure and balanced emphasis on theory and applications. Currently, there are 18 full-time faculty members in the Department of Mechanics and AeroSpace Engineering, including 12 professors, 5 associate professors and 1 assistant professor. The Faculty includes one Fellow of the Chinese Academy of Sciences, one Fellow of the Chinese Academy of Engineering, and one Fellow of the Canadian Academies. All current faculty members have overseas studying and/or working experience. Most of them have extensive teaching and scientific research experience, broad vision in their fields, expertise knowledge, and a strong sense of shared responsibility. They are competent in classroom teaching, supervising graduate and undergraduate students, and conducting cutting-edge research.

Theoretical and Applied Mechanics Degree Program, with the characteristics of applied science, is not only a fundamental science discipline with a wide range of applications, but also an area with a long history, rapid development and many applications in modern science and engineering. The knowledge of mechanics is the theoretical and technical basis of many industries and engineering

disciplines, such as aerospace, automobile, civil, mechanical, manufacturing, ocean engineering and many others. Therefore, the Degree Program of Theoretical and Applied Mechanics enables young talents to tackle diverse challenging problems in science and engineering.

The faculty and students from the Department of Mechanics and Aerospace Engineering strive to establish a highly internationalized and distinctive undergraduate program in Theoretical and Applied Mechanics, with the goal to advance the department to a world-class ranking in its ability to combine Entrepreneurship, Learning, and Research, as well as to link closely to the aerospace industry to meet the major national demands.

II. Objectives

Through the Theoretical and Applied Mechanics Degree Program, highly-capable researchers and engineers will be trained to master the basic theory as well as practical experimental and computational knowledge and skills in mechanics, so that they can devote themselves to the scientific research, education, technology development and management in the fields of mechanics and other related science and engineering fields.

III. Study Length and Degree Requirements

Study length: 4 years

Degree conferred: Bachelor of Engineering

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

IV. Discipline

Theoretical and Applied Mechanics

V. Main Courses

Major Foundational Courses: CAD and Engineering Drawing, Linear Algebra II, Mathematical Methods in Physics, Theoretical Mechanics I, Probability and Statistics, Ordinary Differential Equations B.

Major Core Courses: Mechanics of Materials, Theoretical Mechanics II, Fluid Mechanics, Elasticity, Fluid Mechanics Lab, Fluid Mechanics Lab, Solid Mechanics Lab

VI. Practice-Based Courses

Research and Innovation Projects，Awareness Practice of Manufacturing Engineering，Summer Internship，

Degree Thesis (or Design), etc.

VII. Course Structure and Credit Requirements

General Education (GE) Required Courses: 45 credits(25 credits for Science Module, 16 credits for Citizenship Education Module, 4 credits for PE Module, not including English courses);

General Education (GE) Elective Courses: 10 credits (4 credits for Humanities Module, 4 credits for Social Sciences Module, and 2 credits for Arts Module);

Major Foundational Courses: 21 credits;

Major Core Courses: 20 credits;

Major Elective Courses: 21 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		MA
MA102B	Calculus II A	4		4	Spr/Fall	B/E	MA101B	
MA103A	Linear Algebra I-A	4		4	Spr/Fall	B/E		MA
PHY103B	General Physics B (I)	4		4	Spr/Fall	B/E		PHY
PHY105B	General Physics B (II)	4		4	Spr/Fall	B/E	PHY103B	
CS102B	Introduction to Computer Programming B	3	1	4	Spr/Fall	B/E		CS
PHY104B	Experiments of Fundamental Physics	2	2	4	Spr/Fall	B/E		PHY
Total		**25**	**3**	**28**				

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 Course (Foundational and Core Courses)

Course Category	Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the course	language Instruction	Prerequisite	Dept.
Major Foundational Courses	ME102	CAD and Engineering Drawing	3	1.5	4.5	Spr/Fall /Smr	1/Spr	B	NA	ME
	MA104b	Linear Algebra II	4		4	Spr/Fall	1/Spr	B	MA103A	MA
	PHY203-15	Mathematical Methods in Physics	4		4	Spr/Fall	2/Spr	B	MA102B PHY105B MA103A	PHY / MAE
	MAE203	Theoretical Mechanics I	3		3	Fall	2/Fall	C	MA104b MA102B	
	MA212	Probability and Statistics	3		3	Spr/Fall	2/Fall	B	MA102C	MA
	MA201b	Ordinary Differential Equations B	4		4	Spr/Fall	2/Fall	B	MA102C	MA
	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**					

1: Analytical Mechanics (PHY205) can replace Theoretical Mechanics II (MAE204)

2: If you have taken the course Analytical Mechanics (PHY205) or Theoretical Mechanics II (MAE204), and taken the Linear Algebra II (MA104b) at the same time, the Theoretical Mechanics I (MAE203) can be replaced by Theoretical Mechanics I –B (MAE203b).

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the course	language Instruction	Prerequisite	Dept.
MAE498	Research and Innovation Projects of Mechanics and Aerospace Engineering	2	2	4	Spr/Fall	2/Fall--4/Fall	C	NA	
MAE205	Introduction to Aeronautics and Mechanics	2		2	Spr/Fall	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	Spr/Fall	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	MAE303 OR MAE207	
MAE310	Computational Solid Mechanics	3		3	Spr	3/Spr	B	MAE202	
MAE308	Heat Transfer	3		3	Spr	3/Spr	E	MA102B	
MAE319	Interfacial Phenomena	3		3	Spr	3/Spr	C	PHY105B	
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		
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	
MAE410	Fracture Mechanics	3		3	Spr	4/Spr	E	MAE202	
EE104	Fundamentals of Electric Circuits	2		2	Spr	1/Spr	B	MA103B MA101B	EE
CS205	C/C++ Programming Design	3	1	4	Spr	1/Spr	C	NA	CS
CS203B	Data Structures and Algorithm Analysis B	3	1	4	Fall	2/Fall	B	CS102A	CS
MA303	Partial Differential Equations	3		3	Fall	3/Fall	B	MA201a OR MA201b	MA
ME303	Fundamentals of Machine Design	3		3	Spr/Fall	3/Fall	B	ME102 MAE203B MAE202	ME
ME307	Fundamentals of Control Engineering	3	1	4	Spr/Fall	3/Fall	B	MA201b EE104	ME
ME306	Fundamentals of Robotics	3	1	4	Spr/Fall	3/Spr	B	ME303 ME307	ME
ME310	Fundamentals of Measurement Technology	3		3	Spr	3/Spr	B	ME307 EE205	ME
PHYS001	Open Physics Laboratory I	1	1	2	Smr	1/SU	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
CH101B	General Chemistry B	3		3	Spr/Fall	3/Spr	B/E		CH
BIO102B	Introduction to Life Science	3			Spr/Fall	3/Spr	B/E		BIO
Total		**107**	**16**	**123**					

1: At least choose 21 credits for the above courses. MAE's course no less than 12 credits.
2: Necessary to choose one from the course Computational Fluid Dynamics (MAE403) and Computational Solid Mechanics (MAE310).
3: Fluid research directions required Course: At least choose one from the course of Engineering Thermodynamics (MAE305), Aerodynamics (MAE405) and Heat Transfer (MAE308);
Solid Mechanics research directions required Course: At least choose one from the course of Theory of Vibration (MAE318) and Mechanics of Composite Materials (MAE413).
4: Engineering Thermodynamics (MAE305) can be replaced by Thermodynamics and Statistical Physics I （PHY204）

Table 3: Overview of Practice-Based Courses

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

Table 4: Overview of Course Hours and Credits

Course Category	Total Course Hours	Total Credits	Credit Requirements	Percentage of the Total*
General Education (GE) Required Courses (not including English courses)		45	45	33.6%
General Education (GE) Elective Courses			10	7.5%
Major Foundational Courses	360	21	21	15.7%
Major Core Courses	416	20	20	14.9%
Major Elective Courses	1776	95	21	15.7%
Research Projects, Internship and Undergraduate Thesis/Projects	544	17	17	12.7%
Total (not including English courses)	3096	202	134	100%

*** Percentage of the total= Credit requirements of each line / Total credit requirements**

Curriculum Structure of Theoretical and Applied Mechanics

