

# DEPARTMENT OF AEROSPACE ENGINEERING

## *Chairman*

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**Dr. Ayman M. Abdallah**

## *Faculty*

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Abdelrahman  
Al-Garni

Niyasdeen  
Al-fifi

Ghazy  
Naveed

The Aerospace Engineering Department (AE) offers a well-established graduate Program leading to Master of Science in Aerospace Engineering. The Department started its Master of Science program in the academic year 2004-2005. The Program focuses on academic excellence as well as the professional development of graduate students, rather than just completing a prescribed set of courses. The graduate students are expected to demonstrate competence in a series of professional requirements that need creativity. The Program emphasizes the application of theoretical principles to practical problems in the field of aerospace engineering and helps in providing the Kingdom with high caliber professional engineers, who are needed for the development of the country. The M.S. Program offers specialization in four major fields of Aerospace Engineering: Aerodynamics and Gas Dynamics, Flight Dynamics and Control, Aerospace Structures, and Propulsion.

In addition, the M.S. Program offers a wide selection of graduate courses and research activities with a flavor of aviation, which is needed by the local industry. These include, but not limited to, water desalination, renewable energy applications, and aviation maintenance. Thereby the student can fulfill his degree requirements, and complete and defend his thesis based on original work in one of the major areas of Aerospace Engineering.

The research activities of the department of Aerospace Engineering are exceptionally diverse and broad. Research is conducted in the following major Aerospace fields: Aerodynamics and Gas Dynamics, Aerospace Structures, Flight Dynamics and Control, Propulsion and Aviation. The Aerospace Engineering Department has the following laboratories with advanced equipment for teaching and research purposes: Aero and Fluid Dynamics, Avionics and UAV, Flight Dynamics and Control, Propulsion, Aerospace Simulation, Aero Structures and Composite Materials, Wind Tunnel Facility, Aircraft Hangar, Computational Facility.

### **Admission Requirements**

Admission to the Mater Program in Areospace Engineering requires fulfilling all requirements of the Deanship of Graduate Studies. Additionally, a student must hold a Bachelor's degree in Aerospace Engineering or other engineering or sciences with a minimum GPA of 3.00 (on a 4-point scale) from an institution whose undergraduate program is equivalent in length, content and quality to that of KFUPM. An applicant whose academic credentials do not meet regular admission requirements may be given some deficiency courses depending on the case.

## MASTER IN AEROSPACE ENGINEERING

### Degree Requirements

<b>(a) Core Courses (12 credit hours)</b>	<b>Credit Hours</b>
Aerodynamics of Compressible Flow	AE 520 3
Flight Dynamics and Control I	AE 540 3
Seminar	AE 599 0
Thesis	AE 610 6
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<b>(b) Elective Courses (18 credit hours)</b>	
Two AE Elective Courses	AE xxx 6
One Math Elective Course	MATH 5xx 3
Two Technical Elective Courses from Engineering or Science	XXX xxx 6
One Free Elective Course	XXX xxx 3

### Degree Plan

COURSE	TITLE	LT	LB	CR	COURSE	TITLE	LT	LB	CR
<b>First Year</b>									
AE 520	Aerodynamics of Compressible Flow	3	0	3	AE 540	Flight Dynamics and Control I	3	0	3
AE xxx	AE Elective I	3	0	3	AE 5xx	AE Elective II	3	0	3
MATH 5xx	Math Elective	3	0	3	XXX xxx	Technical Elective I	3	0	3
					AE 599	Seminar	1	0	0
		<b>9</b>	<b>0</b>	<b>9</b>			<b>10</b>	<b>0</b>	<b>9</b>
<b>Second Year</b>									
XXX xxx	Technical Elective II	3	0	3	AE 610	Thesis	0	0	6
XXX xxx	Free Elective	3	0	3					
AE 610	Thesis	0	0	IP					
		<b>6</b>	<b>0</b>	<b>6</b>			<b>0</b>	<b>0</b>	<b>6</b>
<b>Total credit hours required in Degree Program : 30</b>									



**AE 546                    Fundamentals of Helicopter Flight                    (3-0-3)**

Introduction to hovering theory; hovering and axial flight performance; concepts of blade motion and control; aerodynamics and performance of forward flight. Introduction to aeroacoustics. Methods to solve rotor dynamics problems. Helicopter stability and control.

**Prerequisite:** Graduate Standing

**AE 548                    Aerospace Avionics, Navigation and Guidance                    (3-0-3)**

Principles of avionics, navigation and guidance. Deterministic and stochastic linear perturbation theory. Position fixing and celestial navigation with redundant measurements. Recursive navigation and Kalman filtering. Pursuit guidance, proportional navigation, ballistic guidance and velocity-to-be-gained guidance. Hardware mechanization.

**Prerequisite:** Graduate Standing

**AE 550                    Aircraft Propulsion                    (3-0-3)**

Advanced analysis of aircraft propulsion; gas turbine cycles for aircraft propulsion. Engine off-design performance. The environmental impact. Aircraft propulsion case study design. Numerical solutions in aircraft propulsion.

**Prerequisite:** Graduate Standing

**AE 554                    Rocket Propulsion                    (3-0-3)**

Advanced analysis of rocket propulsion; multi stage rockets, trajectories in power flight; electric propulsion, space propulsion. The environmental impact. Rocket propulsion case study design. Numerical solutions in rocket propulsion.

**Prerequisite:** Graduate Standing

**AE 560                    Aerospace and Aviation Maintenance                    (3-0-3)**

General regulations for aerospace and aviation maintenance. Hydraulic, power, electrical and electronic, instrument landing and support systems maintenance. Troubleshooting procedures, evaluation, repair, installation and inspection techniques. Aviation maintenance systems management, maintenance planning, forecasting and cost control, reliability; safety and flight schedule. Field project.

**Prerequisite:** Graduate Standing

**AE 564                    Air Traffic Control                    (3-0-3)**

Fundamental of air traffic control (ATC) system. Federal aviation administration (FAA). Navigational aids, airspace, communication, federal aviation regulations (FARs), ATC procedures control tower operations; non-radar operations, radar operations. Instrument flight rules (IFR) in the enroute and terminal ATC facilities; human factors; air traffic safety and management. Aviation weather. Field Project.

**Prerequisite:** Graduate Standing

**AE 566                    Flight and Aviation Safety                    (3-0-3)**

Personal and organizational safety procedures and goals; safety philosophies, human factors. Principles of accident investigation, aircraft accident reports; accident prevention



