



MECHANICAL  
ENGINEERING  
& MATERIALS  
SCIENCE

## Graduate Certificate in Aerospace

### (SOAR Program)

The Mechanical Engineering & Materials Science Department offers an Aerospace Graduate Certificate. Studies and Opportunities in Aerospace Research, also known as SOAR, is a program in mechanical engineering which trains engineers to develop tomorrow’s ultra-efficient aircraft, including drones and UAV's, and to find solutions to problems surrounding fuel consumption, noise, and emissions. The objective of the program is to provide a venue for graduate students to concentrate their Duke learning experience with a focus on aerospace research and technology.

**Current Eligibility:** Pratt MEMS MS, MEng and PhD students. Students must declare that they are to be part of this certificate program in their first semester. After enrollment, students will be assigned an aerospace research advisor.

1. \_\_\_\_\_  
Last or Family Name (print)                      First                      Middle
2. Current Mailing Address: \_\_\_\_\_  
Street                      City                      State                      Zip
3. Telephone number(s) at which you can be reached: Day ( ) \_\_\_\_\_ Evening ( ) \_\_\_\_\_
4. Email address: \_\_\_\_\_
5. Desired year and term of enrollment in certificate program:  
Year: 20 \_\_\_\_ Check one: Fall \_\_\_\_ Spring \_\_\_\_ Summer \_\_\_\_
6. School and department in which you are currently enrolled: \_\_\_\_\_

Students admitted to a graduate certificate program are subject to the general policies and procedures of the Mechanical Engineering & Materials Science Department. Your signature below indicates your understanding and acceptance of this.

\_\_\_\_\_  
Signature of Applicant

\_\_\_\_\_  
Date

**PhD Students - Please return application to Julia Orledge-Diehl, Box 90300, Durham, NC 27708.**

**Masters Students - Please return application to Brandy Oldham, Box 90300, Durham, NC 27708.**

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#### For Office Use Only – Certificate Program Approval

Your signature below indicates your approval of this student to participate in the certificate program noted above.

\_\_\_\_\_  
Dr. Robert Kielb  
SOAR Program Director

\_\_\_\_\_  
Date

## Certificate Course List

A minimum of 4 courses, 500-level or above, chosen from the following list. Each focus area has 2 required “core” courses. At least 1 of the required courses must be in another area. Only 1 Mathematical and Computational Methods course can be counted as one of the four required courses. This list will be updated at the beginning of fall and spring semesters.

### Courses:

#### Structures & Dynamics

- ME 544: Advanced Mechanical Vibrations CORE (F)
- ME 524/CEE530 - Introduction to the Finite Element Methods CORE (S)
- ME 527 - Buckling of Engineering Structures (Every other Spring)
- ME 541: Intermediate Dynamics (S)
- CEE 541: Structural Dynamics (Every other Fall, even years)
- ME 742: Non-Linear Mechanical Vibrations (S)
- CEE 629: System Identification (Every other Spring, even years)

#### Aerodynamics and Acoustics

- ME 581: Aerodynamics, CORE (F)
- ME 572: Engineering Acoustics CORE (S)
- ME 672: Unsteady Aerodynamics, CORE (F)
- ME 671: Advanced Aerodynamics (Occasionally)
- ME 555: Advanced Acoustics (Occasionally)
- ME 775: Aeroelasticity (S)

#### Mathematical and Computational Methods

- MATH 551: Applied Partial Differential Equations & Complex Variables (F)
- MATH 577: Mathematical Modeling (S)
- ME 639: Computational Fluid Mechanics and Heat Transfer (Occasionally)
- MATH 561: Numerical Linear Algebra, Optimization & Monte Carlo Simulation (F)
- COMPSCI 520: Numerical Analysis (S)
- MATH 563: Applied Computational Analysis (S)