## Aerospace Graduate Certificate (SOAR Program)

The Department of Mechanical Engineering and Materials Science offers an Aerospace Graduate Certificate for eligible graduate students. The *Studies and Opportunities in Aerospace Research* (SOAR) program provides engineering students with specialized training in aerospace applications and technologies. The program allows graduate students to enhance their learning experience by focusing on key areas of aerospace research, with a concentration in Structures and Dynamics or Aerodynamics and Acoustics.

**Current Eligibility:** Pratt MEMS MS, MEng and PhD students. Students should 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.

#### **Requirements:**

- Participants must select a focus area, either Structures & Dynamics or Aerodynamics & Acoustics.
- Complete four technical courses.
  - Each focus area has two (2) required core courses.
  - $\circ$  2 additional courses must be taken, at least one (1) must be in another focus area.
    - Please note, only one (1) Mathematical and Computational Methods course can be counted toward the four required courses.
- Present aerospace research to program faculty in aerospace concentration.
  - Master of Science (MS) students <u>cannot</u> use their MS Research Project Non-Thesis Poster or Thesis defense as their presentation.
  - PhD students may use their prelimary exam as their presentation, however, a presentation such as those prepared for conferences is preferred.
- Attend four aerospace seminars.

#### **Certificate Course List**

The following is a list of approved certificate courses. This list is subject to change over time as new courses are offered, including special topics offerings. (Other courses may be approved *in advance* by the Program Director.)

Consult the Certificate Program Director for guidance and approval. Courses marked with an asterisk qualify as an introductory survey course.

#### Structures & Dynamics Courses:

- ME 544 Advanced Mechanical Vibrations (Fall)—Core Course
- ME 524/CE 530 Introduction to Finite Element Methods (Spring)—Core Course
- ME 527 Buckling of Engineering Structures (Every other Spring)
- CEE 541 Structural Dynamics (Occasionally)
- ME 541 Intermediate Dynamics (Fall)
- ME 742 Nonlinear Mechanical Vibrations (Spring)
- CEE 629 System Identification (Every other Spring, even years)

#### Aerodynamics & Acoustics Courses:

- ME 571 Aerodynamics (Fall)—Core Course
- ME 572 Engineering Acoustics (Spring)—Core Course
- ME 672 Unsteady Aerodynamics (Fall)

- ME 671 Advanced Aerodynamics (Occasionally)
- ME 555 Advanced Acoustics (Occasionally)
- ME 775 Aeroelasticity (Spring)

### Mathematical and Computation Methods Courses:

- MATH 551 Applied Partial Differential Equations & Complex Variables (Fall)
- MATH 577 Mathematical Modeling (Spring)
- ME 639 Computational Fluid Mechanics and Heat Transfer (Fall)
- ME 524/CE 530 Finite Element Method (Fall)
- MATH 561 Numerical Linear Algebra, Optimization & Monte Carlo Simulation (Fall)
- COMPSCI 520 Numerical Analysis (Spring)
- MATH 563 Applied Computational Analysis (Spring)

#### **Process to Earn the Certificate**

Apply to the certificate program by completing the attached form.

Master's Students: Please email form to Shauntil Gray, <u>shauntil.gray@duke.edu</u> or mail to Box 90300, Durham, NC 27708.

PhD Students: Please email form to Michell Tampe, <u>michell.tampe@duke.edu</u> or mail to Box 90300, Durham, NC 27708.

Students should apply to the certificate program during their first semester and consult with the the Certificate Program Director for guidance on courses if they have questions or concerns.

Complete the requirements of the certificate and provide updated Certificate Plan to the Certificate Program Director *and* your program coordinator as you complete requirements.

#### **Certificate Program Contacts:**

Certificate Program Director: Professor Kenneth C. Hall

Master's Program Coordinator: Shauntil Gray

PhD Program Coordinator: Michell Tampe

# Graduate Certificate in Aerospace (SOAR)

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| 1. Last or Family Name (print  | ) First   | Middle  | Last                               |   |
|--|---|---|------------------------------------|---|
| 2. Current Mailing Address: _  | Street  | City  | State                              | Zip   |
| 3. Telephone number(s) at wh   | ich you can be r  | eached: Day (   | <u>)</u> Eve                       | ening ( )                                       |
| 4. Email address:  |   |   |                                    |   |
| 5. Year and term of enrollmen  | t in certificate p  | rogram: Year: 2                                       | 02_ Check one                      | : FallSpring                                    |
| 6. School and Department in v  | which you are cu  | rrently enrolled                                      | :                                  |   |
| Students admitted to a graduat<br>of the Mechanical Engineering<br>your understanding and accept | e certificate prog<br>g & Materials Sc<br>ance of this requ | gram are subject<br>ience Departme<br>uirement.       | to the general<br>nt. Your signat  | policies and procedures<br>cure below indicates |
| Signature of Applicant   |   | Ī   | Date                               |   |
| PhD Students - Please return appl<br>Masters Students - Please return a                          | lication to Michel<br>application to Sha                    | ll Tampe at <u>miche</u><br>until Gray at <u>shau</u> | ll.tampe@duke.e<br>ntil.gray@duke. | edu.<br>edu.                                    |
| Fo   | r Office Use Only   | – Certificate Progr                                   | am Approval                        |   |
|  |   |   |                                    |   |

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

Kenneth C. Hall SOAR Program Director Date

#### Student Requirement Worksheet for the SOAR Certificate

Please complete this worksheet and submit to your graduate administrator with a copy to the SOAR Program Director the first week of the term you expect to graduate.

Please list the four courses you believe satisfy the requirements for the SOAR certificate.

| 7.           |   |
|--------------|---|
| 8.           |   |
| 9.           |   |
| 10.          |   |
| Pleas<br>11. | e list the four Aerospace-related seminars you attended. Provide the speaker, title, date and time. |
| 12.          |   |
| 13.          |   |
| 14.          |   |

Please provide the date, title, and audience description for your aerospace research presentation: 15. \_\_\_\_\_

 Signature of Applicant
 Date

PhD Students - Please submit to Michell Tampe at michell.tampe@duke.edu. Masters Students - Please submit to Shauntil Gray at shauntil.gray@duke.edu.