

EMPHASIS IN AERIAL ROBOTICS

Program Requirements

Overview: The Emphasis in Aerial Robotics is sponsored by the Centre for Aerial Robotics Research and Education (CARRE). As an SGS defined, Faculty of Applied Science & Engineering (FASE) recognized technical emphasis program, this program was created to enhance the graduate student experience with a view to further develop your expertise in the burgeoning field of Unmanned Aerial Vehicles (UAVs). This emphasis will complement your graduate degree focusing on integrated research and development on aerial robotics systems, from design, instrumentation, to autonomy.

Eligible graduate students from other Faculty of Applied Science & Engineering departments demonstrating interdisciplinary/complimentary areas of research will be considered for this Emphasis Program, subject to the CARRE Director's approval.

The Emphasis in Aerial Robotics is not tracked through ACORN (previously ROSI). To register your interest in this program, please email the CARRE Program Coordinator at coordinator@carre.utoronto.ca.

Students who successfully complete the requirements of the Emphasis in Aerial Robotics are required to inform the CARRE Program Coordinator at coordinator@carre.utoronto.ca. Upon verification, the technical emphasis will be reflected on the student's academic transcript, in addition a certificate of completion will be issued. The certificate may be claimed by contacting the CARRE Program Coordinator.

Emphasis in Aerial Robotics Program requirements:

- 1) Must be a registered MEng, MASc, PhD student studying in a research area related to Unmanned Aerial Vehicles (UAVs) or Unmanned Aerial Systems (UAS).
- 2) Students from other academic departments whose areas of interdisciplinary study/research support UAVs or UAS may be approved to participate in this Emphasis Program, pending approval from the CARRE Director
- 3) MASc and PhD students must complete:
 - AER1216H (Fundamentals of UAVs) *and* AER1217H (Development of Autonomous UAS);
 - One other course from the approved list (attached) or another related course approved by Director;
 - One MASc/PhD thesis relevant to UAV.
- 4) MEng students must complete:
 - AER1216H (Fundamentals of UAVs) *and* AER1217H (Development of Autonomous UAS);
 - One other course from the approved list (attached) or another related course approved by Director;
 - One MEng project course related to UAV.

5) **In addition to the two mandatory courses of:**

AER1216H - Fundamentals of UAVs;

AER1217H - Development of Autonomous UAS.

Please select **one** additional course from the approved list below:

UTIAS (University of Toronto Institute for Aerospace Studies) Courses:

AER 501H1 - Computational Structural Mechanics and Design Optimization

AER 503H1 - Aeroelasticity

AER 506H1 - Spacecraft Dynamics and Control 1

AER 510H1 - Aerospace Propulsion

ROB 521H1 - Mobile Robotics and Perception

AER 525H1 - Robotics

AER 1202H - Advanced Flight Dynamics

AER 1211H - Human Control of Flight Systems

AER 1303H - Advanced Fluid Mechanics

AER 1308H - Introduction to Modern Flow Control

AER 1310H - Turbulence Modelling

AER 1316H - Fundamentals of Computational Fluid Dynamics

AER 1403H - Advanced Aerospace Structures

AER 1410H - Topology Optimization

AER 1415H - Computational Optimization

AER 1503H - Spacecraft Dynamics and Control II

AER 1513H - State Estimation for Aerospace Vehicles

AER 1514H - Mobile Robotics

CSC (Computer Science) Courses:

CSC 411H1 - Machine Learning and Data Mining

CSC 2503H1 - Foundations of Computational Vision

ECE (Electrical & Computer Engineering) Courses:

ECE 537H1 - Random Processes

ECE 1505H1 - Convex Optimization

ECE 1512H1 - Digital Image Processing & Applications

ECE 1762H1 - Algorithms & Data Structures

MIE (Mechanical & Industrial Engineering) Courses:

MIE 506H1 - MEMS Design and Microfabrication

MIE 1740H1 - Smart Materials and Structures

MIE 1809H1 - Advanced Mechatronics

For more information, please contact the CARRE Program Coordinator at coordinator@carre.utoronto.ca.