# Course Syllabus

## Course Information

Course Title: Planning, Learning, and Control for Autonomous Space Robots
Course Code: ME-GY 7863 A, CSCI-GA 3033 7863
Term/Year: Fall 2025
Meeting Times: Mondays, 2:00 PM - 4:30 PM
Location: Jacobs Hall, 6 Metrotech Room 211, Brooklyn Campus
Units: 3

## Instructor Information

Name: Benjamin Riviere
Email: riviere.b@nyu.edu
Office Location: Office Number: 118, Building: 5 MetroTech
Office Hours: Thursday 1-2pm walk in or by appointment (preferred)

## Course Description

This class will study the math and implementation of planning, learning, and control algorithms through applications in spacecraft, rocket landings, and rover autonomy. We will cover classical topics and emerging research areas in linear and nonlinear dynamics, optimal control, numerical optimization, Bayesian estimation, search-based planning, and reinforcement learning. We will study existing applications like precision rocket landings and martian rover path planning, and proposed future missions like distributed apertures of spacecraft swarms and complex locomotion for planetary exploration.

## Learning Outcomes

By the end of this course, students will:

- have fundamental understanding of robot planning, learning, and control
- have an introduction to aerospace robotics applications
- be prepared to research and devise novel methods and algorithms

## Tentative Course Schedule

| Week | Topic |
|---|---|
| 1-5 | Spacecraft: Dynamical Systems and Stability |

| | |
|---|---|
| 6-10 | Rockets: Convex Optimization |
| 11-15 | Rovers: Planning & Reinforcement Learning |

## Assignments & Grading

| Component | Weight (%) |
|---|---|
| Attendance | 10 |
| Project 1 | 40 |
| Project 2 | 50 |

## Policy on Generative AI:

In this class, the risk of generative AI (Chat GPT, Gemini, etc) is learning loss, not cheating. The course policy is that you can use it and I actually encourage it in moderation. Keep in mind that your project grades (majority of grade) will be determined by your ability to communicate and demonstrate understanding. If you over rely on it, it will probably be obvious and you will get a bad grade.