

MAE 511: Advanced Dynamics I¹

(Syllabus as of May 8, 2025)

Summer, 2025

Description: This course will cover basic topics in Advanced Dynamics, including three-dimensional kinematics, Newton-Euler methods, and analytical mechanics (e.g. Lagrange's equations). Students taking the course should have a basic knowledge of dynamics (particle dynamics and two-dimensional rigid-body dynamics) and should have a Math background which includes Calculus III and Differential Equations.

Instructor: A. Mazzoleni
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Grader/Teaching Assistant: Ashwin Vadlamannati <avadlam4@ncsu.edu>

Topics: Three-dimensional Kinematics
Newton-Euler Methods for Mechanics
Analytical Mechanics (e.g. Lagrangian Mechanics)
Special Topics (as time permits)

Texts:
Introduction to Space Dynamics, by Thomson, Dover
<http://store.doverpublications.com/0486651134.html>

Methods of Analytical Dynamics, by Meirovitch, Dover
<http://store.doverpublications.com/0486432394.html>

Grading:	Homework/Miscellaneous assignments	40%
	Project: (Parts A and B)	30%
	Proctored Test(s)	30%
	Final Exam (Optional*: see below for details)	

¹ **(also called Advanced Dynamics with Applications to Aerospace Systems)**

*** Note:** Final exam will be optional – if taken, the final exam score will be averaged with the in-class test average, and this average will be used if it improves your overall grade. If the new average does not improve your grade, it will not be counted, i.e. taking the final exam will not reduce your grade.

Policies on late assignments:

Homework and project deadlines will be enforced. Late work will not be accepted unless there is a compelling reason (as determined by the instructor) as to why the assignment is late.

Policies on absences (excused and unexcused) and scheduling makeup work:

The university policy on absences will be enforced. See the university policy at the following URL.

http://www.ncsu.edu/provost/academic_regulations/attend/reg.htm

- The students are responsible for discussing makeup exams if they miss exams due to excused absence. The instructor will choose a mutually agreed date and time for the makeup exam.
- Late submission of homework assignments due to excused absences is not subject to the policies on late assignments.

Academic integrity:

The university, college, and department policies against academic dishonesty will be strictly enforced. You may obtain copies of the NCSU **Code of Student Conduct** from the Office of Student Conduct, or from the following URL.

http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php.

The instructor expects honesty in the completion of test and assignments. It is the understanding and expectation of instructor that the student's signature on any test or assignment means that the student neither gave nor received unauthorized aid.

NC State policy on working with students with disabilities:

“Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Service for Students at 1900 Student Health Center, Campus Box 7509, 515-7653.

http://www.ncsu.edu/provost/offices/affirm_action/dss/

For more information on NC State’s policy on working with students with disabilities, please see:

http://www.ncsu.edu/provost/hat/current/appendix/appen_k.html.