

MECH 5318/6318: Analytical Dynamics

Class Reference Number: 25945
 Class Meeting: 9:00 AM - 10:20 AM TR / Education Building 311
 Instructor: Angel Flores-Abad, PhD
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 Office: A109
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 Office hours: 3:30 PM – 4:30 PM TRs or by appointment

COURSE DESCRIPTION

The course will educate students in finding the equations of motion of systems of particles and multibody structures from the Lagrangian and Hamiltonian Mechanics. The corresponding solution of the dynamics will be addressed analytically and numerically.

TOPICS COVERED

- Newtonian Mechanics
- Degrees of freedom, generalized coordinates and system constraints.
- Principle of virtual work
- Lagrange equations
- Hamiltonian mechanics
- Multibody Dynamics
- Dynamic systems Simulations

GRADING

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| • Homework, quizzes, online activities, in-class assignments, etc. | 60% |
| • Final Project | 40% |

Note. The project for doctoral students must include a deeper analysis of the literature, and the technical approach must have a factor of novelty with respect to the state of the art in the fundamentals or application of analytical dynamics principles.

Scale A \geq 90%, B \geq 80% but <90%, C \geq 70% but <80%, D \geq 60% but <70% and F <60%

Policies

- Correction period: students will have one week after the assignments, quizzes, exams, etc., are returned with grades to ask for any revision; after that week, no changes can be made to the grades.

TEXTBOOKS

- [1] Meirovitch, Leonard. Methods of analytical dynamics. Courier Corporation, 2010.
 [2] Taylor, John R. "Classical Mechanics University Science." (2005).
 [3] Marion, Jerry B. Classical dynamics of particles and systems. Academic Press, 2013.

SOFTWARE

Matlab. <https://www.mathworks.com/academia/tah-portal/university-of-texas-at-el-paso-40735445.html#get>.

Matlba toolboxes: Symbolic, Simscape, Multibody, Spatial Math toolbox.

Mathematica (optional)

Refer to ETC for a specific question. Engineering building E351D (915) 747-5131.

MATERIAL FOR CLASS

Mandatory: Laptop. Bring your computer to all the lectures.

ATTENDANCE AND TARDINESS

Attendance is mandatory. Absences can be checked by the instructor through quizzes, exams, roll call, randomly picked names for problem-solving in class, or other mechanisms. You could receive an F grade if you miss more than three classes without the instructor's consent. The instructor appreciates all efforts to attend the class. Exams and quizzes are given at the beginning of the classes. No additional time will be allowed for late attendees.

ACADEMIC HONESTY

Read the Addendum to Syllabi file available in Blackboard

DISCLAIMER

The above schedule, policies, and assignments in this course are subject to change in the event of contingency or by mutual agreement between the instructor and the students.