

**MECH 4420: Vehicle Dynamics
Fall 2025**

Lowder 155 MW 3:00-4:15 (make-ups on F 3:00-4:15 or MW 4:15-5:00)

Instructor: Dr. David M. Bevly (Wiggins 2418F)

Phone: (334) 844-3446

Email: bevlydm@auburn.edu (limited response)

Office Hours: MW 2-3, 4:30-5:00 or Zoom (if required): <https://auburn.zoom.us/my/dmbevly>

Class Website: <http://eng.auburn.edu/~dmbevly/mech4420/>

Textbook: Rajesh Rajamani, "Vehicle Dynamics and Control," 2012

Supplemental References:

- Gillespie, "Fundamentals of Vehicle Dynamics," 3rd Ed., Prentice Hall Publishing, 1998
- Miliken and Miliken, "Race Car Vehicle Dynamics," SAE, 1995.
- Bosch Automotive Handbook, 4th Edition
- Giancarlo Genta, "Motor Vehicle Dynamics, Modeling and Simulation"
- Dixon, "Tires, Suspension and Handling"
- S.J. Reeves, Beginning MATLAB for Engineers, S. J. Reeves
- Car Talk with Tom and Ray Magliozzi <http://www.cartalk.com/>
- The Garage section at <http://www.nascar.com>
- Matlab Help located at: http://www.eng.auburn.edu/departments/ee/pages/comp_tools.html

Pre-Requisites: MECH 3140

Grading Policy:

Exam	20
Homework	40
Labs	20
Project	20
Total	100

Scale:

90-100 - A	70-79 - C
80-89 - B	60-69 - D
Below 60 - F	

HW Grades:

A lottery will be held where students must come explain their m-code. Additionally short homework quizzes may be given to validate your understanding of the homework assignments. Homework grades will be determined as follows:

$$\text{Grade}=(\text{hw_grade}/2)*(1+\text{hw_quiz}/10)$$

Tentative Lecture Topic Outline (Subject to Change):

<u>Week</u>	<u>Topic</u>
1	Review of Dynamics
2	Tire Mechanics
3	Longitudinal Dynamics (Acceleration, Braking, ABS)
4	Sensors, Instrumentation, Data Analysis
5	Steady Handling (including weight transfer/roll)
6	Transient and Limit Handling
10	Phase Plane Portraits
11	Steering Control
12	State Space Control
13	State Space Estimation
14	Suspensions and Ride Quality
15	Suspension and Steering Design

Final projects will be presented in lieu of a final exam (December 8th or 9th at 1:30 pm)

General Policies

Class attendance is expected but not *formally* recorded. Late submission of assigned work or make-up examinations will be allowed if and only if accompanied by an approved University excuse. Additionally, I expect a very high standard of honesty among students at Auburn University as I feel that engineers with moral integrity is of the utmost importance in society. Because of the importance of academic honesty to the reputation of Auburn Engineers, I will report violations of academic honesty as outlined in the Auburn Tiger Cub.

Accessibility

It is the policy of Auburn University to provide accessibility to its programs and activities, and reasonable accommodations for persons defined as having a disability under Section 504 of the rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990. Students who need special accommodations should make an appointment to see the instructor as soon as possible or contact The Student with Disabilities Program office at (334) 844-5943 (Voice/TT)

Assignment Submissions:

Unless otherwise specified, all assignments are to be submitted as physical copies in class (**STAPLED**). If the need arises, we may accept submissions via Canvas as a **SINGLE PDF File**. Failure to submit work as a single file will result in the submission not being graded. There are several applications for smartphones such as “CamScanner” to accomplish this. You should also be wary of file size to facilitate uploading.

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Excused Absences:

All excuses (including COVID) will come from ESS using this link: <https://aub.ie/EngAbsence>.

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Additional Resources:

If you or someone you know needs assistance, you are encouraged to contact Auburn Cares in Student Affairs at 334-844-1305 or aub.ie/auburncares. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services. To speak with a counselor 24/7/365, you can contact Student Counseling & Psychological Services at 334-844-5123.

Instruction, Office Hours, and Pandemics:

Due to unforeseen circumstances or changes in university guidance, the syllabus and course is subject to change, and you will be notified as soon as possible to any changes to the course syllabus. We will follow the requirements of Auburn University. If the classroom environment has to be modified or alternative instruction delivery mechanisms used, we will address them at that time. No quizzes or exams will be allowed to be taken remotely (unless mandated by Auburn University).