

# *ME1015 Rigid Body Dynamics*

SPRING, 2026

<b>INSTRUCTOR:</b>	Dr. Ruiqi DONG
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<b>OFFICE HOURS:</b>	Wednesday 9:00~12:00 AM & 14:00~18:00 PM Any other days - by appointment only at N522
<b>LECTURES:</b>	Tuesday 13:50-16:25 PM, S503
<b>TEXTBOOK:</b>	Engineering Mechanics Dynamics. <b>9th edition</b> by <i>J. L. Meriam, L. G. Kraige, and J. N. Bolton</i> , John Wiley & Sons, Inc. New York, 2018.
<b>TEACHING ASSISTANT:</b>	Xue Jingxin, 2023ME Tel: 15192685031, E-mail: xuejingxin@stu.scu.edu.cn
<b>PREREQUISITE:</b>	MATH 0240 Analytic Geometry & Calculus 3 ENGR 0135 Statics & Mechanics of Materials I

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**DESCRIPTION:** This is 3 credit hour course intended to introduce students to the motion of particles and rigid bodies. Students are expected to develop an understanding of the fundamental principles of applied kinematics for particles and rigid bodies in engineering dynamics and demonstrate an integrated understanding of engineering dynamics principles through applications involving problem solving and through creation of design solutions to engineering scenarios.

**COURSE OBJECTIVES:** At the end of the course, the student would be able to:

- ✓ Interpret the geometry and physical meaning of mechanical systems by drawing diagrams (free body diagrams and kinematic diagrams)
- ✓ Apply several governing methods (Newton laws, work-energy, impulse-momentum) to study mechanical systems
- ✓ Analyze and predict the kinematics and kinetics of a body using various reference frame

## LEARNING OUTCOMES FOR THIS COURSE:

- (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- (3) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- (4) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## GRADE DETERMINATION:

While grades may be curved, there is no guarantee of any curve. If any student fails this course and takes Make-Up exam, the highest grade that student can receive is D.

<b>Homework</b>	<b>10%</b>
<b>In-class quiz</b>	<b>20%</b>
<b>Mid-term exam</b>	<b>40%</b>
<b>Final exam</b>	<b>30%</b>

## EXAMS:

- (1) There will be one mid-term exam and one final exam. The exams in this course will be **closed book and closed note**. A **formula sheet** will be provided in the **final exam**, but it will not be announced before the exam.
- (2) If you are absent from any exam without a valid reason and prior report, there will be **no make-up exam**.
- (3) For **mid-term exam**, if you have a serious conflict with the exam time, you must discuss it with the instructor well ahead of the scheduled exam day (**at least one day in advance**) to make an appropriate arrangement.
- (4) For **final exam**, if you have a valid reason for not being able to attend the final exam, you must **submit a formal application for a deferred exam** to the administration.
- (5) Exams missed due to unpredictable events such as a family emergency and a traffic accident will be handled according to **SCU and institutional policies**, if the student has a proper document(s) to prove it.

## QUIZZES:

In-Class Quiz will be given periodically during class hours, and there is **no make-up** for quiz if you are absent from the class. You will work on and complete these problems as an individual within given time. All the In-Class Quiz and homework should be **submitted on BB**, and the answers **must be handwritten** otherwise no credit will be given for that work.

## HOMEWORK:

There will be homework problems assigned on weekly base, which must be submitted on BB before the deadline. I strongly encourage for students to work on homework on their own since doing homework independently will reinforce and extend the knowledge of the material learned in class. Students are also encouraged to work with your classmates. Should you have any trouble with the homework, ask TA and instructors for help during designated office hours.

## GRADE REBUTTAL:

- (1) For homework and quizzes, challenge to the grading must be made **within 3 days** after the returned of the graded assessment item. **No challenges** to the grading will be entertained **after the final exam**.
- (2) For exams, graded papers and standard answers will not be handed out. If you have enough confidence to argue about your score, please check your test paper at the time and place designated by the instructor or TA, and there is **no guarantee that the score will change** in any way.

## MAKE-UP POLICY:

If you fail this course, the eligibility and grading criteria for the make-up exam at the beginning of the next semester will be implemented in accordance with university policies. The scope and requirements of the make-up exam are the same as those of the final exam.

## OTHER POLICIES: ATTENDANCE:

- ✓ Although attendance is not included in the grading, Sichuan University attendance policy will be enforced. Students who missed **more than a third of the classes** (these absences included classes missed with and without approval and valid reasons) will lose the right to be assessed and will receive zero for the course. These students will NOT be allowed to take the makeup exam.

## ACADEMIC MISCONDUCT:

- ✓ All students in attendance at the Sichuan University are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any

academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student. Academic misconduct will not be tolerated. All misconduct will be reported and *The Academic Misconduct Disciplinary Policy* will be followed in the event of academic misconduct.

**CHANGES:**

- ✓ The instructor reserves the right to extend credit for alternative assignments, projects, or presentations and to make changes to this syllabus as needed. All changes will be announced via Blackboard and/or announced in class.

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## ***Tentative Course Schedule (changes will be announced):***

<b>Week</b>	<b>Chapter</b>	<b>Topic &amp; Description</b>
1	Chap. 1	Introduction - Basic Concepts, Newton's Law, Units
2	Chap. 2.1 ~ 2.5	Rectilinear & Curvilinear Motion in Rectangular and Normal & Tangential Coordinates
3	Chap. 2.6 ~ 2.8	Polar Coordinates, Space Curvilinear Motion and Relative Motion
4	Chap. 3.1 ~ 3.4	Kinetics - Equation of Motion and Curvilinear Motion
5	Chap. 3.5 ~ 3.7	Work and Kinetic, Potential Energy, Conservation of Energy
6	Chap. 3.8 ~ 3.10	Linear/Angular Impulse & Momentum, Conservation of Momentum
7	Chap. 3.11	Impact and Chapter Review
8	Chap. 4.1 ~ 4.5	Generalized Newton's Law, Work-Energy and Impulse-Momentum Principle
<b>9</b>	<b>Chap. 2 ~ 4</b>	<b>Mid-Term Exam</b>
10	Chap. 5.1 ~ 5.4	Rotation, Absolute Motion and Relative Velocity
11	Chap. 5.5 ~ 5.7	Instantaneous Center of Zero Velocity and Relative Acceleration
12	Chap. 6.1 ~ 6.3	MMI, General Equations of Motion, Translation

13	Chap. 6.4 ~ 6.5	General Equations of Motion for Fixed-Axis Rotation and General Plane Motion
14	Chap. 6.6 ~ 6.7	Work-Energy Relations and Power
15	Chap. 6.8	Impulse-Momentum Equations, Impact of Rigid Bodies
16	Review	<b>Chap. 5 ~ 6</b>
17	<b>Final Exam</b>	