



MASTER COURSE OUTLINE

A. PHYS 2201 Classical Physics I

B. COURSE DESCRIPTION:

This is the first semester of the calculus-based introductory physics sequence typically required for students majoring in engineering, computer science, mathematics, physics, chemistry, and other physical science disciplines. The emphasis of this course is on developing the problem-solving skills needed to solve physics problems while understanding the underlying physics principles. The first semester of the physics sequence covers mechanics. Laboratory is an essential component of the course. Prerequisite: Successful completion of or concurrent enrollment in MATH 1210 Calculus and Analytic Geometry I. Students who have successfully completed high school calculus may be allowed to take the course with the instructor's permission.

MnTC (Goal 3/NS and 2/CT); (5 Cr – 4 lect, 1 lab)

C. *Core Theme: Critical Thinking **Discipline Area (if MnTC): Natural Sciences

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES:

This course addresses the following Riverland Institutional Learning Outcome(s):

- ILO 1: critical thinking (*Core Theme Goal 2*)
- ILO 2: awareness of the larger global community (*Core Theme Goal 7 or 8*)
- ILO 3: ethical, engaged citizenship (*Core Theme Goal 9 or 10*)
- ILO 4: communication and collaboration (*Discipline Goal 1 and by any learning outcome(s) involving communication or collaboration*)

E. MAJOR CONTENT AREAS:

- Measurement & Motion
 - scalars, vectors, and unit vectors
 - 1-D and 2-D kinematics
- Newton's laws of motion
- Energy
 - work-energy theorem
 - conservation of mechanical energy
 - conservative and nonconservative forces
- Momentum
 - impulse-momentum theorem

- conservation of momentum
- Rotational Motion
 - rotational kinematics
 - torque and static equilibrium
 - conservation of angular momentum
 - rotational dynamics
- Waves and oscillations
- Gravitation

F. GOAL TYPES, OBJECTIVES, AND OUTCOMES:

<u>GOAL</u>	<u>OBJECTIVES</u> Students will be able to	<u>OUTCOMES</u> The student will successfully
<u>MnTC Goal 3a</u>	demonstrate understanding of scientific theories.	<ol style="list-style-type: none"> 1. demonstrate an understanding of physics theories related to mechanics. 2. apply physics theories to everyday physical phenomena.
<u>MnTC Goal 3c</u>	communicate their experimental findings, analyses and interpretations both orally and in writing.	<ol style="list-style-type: none"> 1. perform physics experiments. 2. record, analyze, and draw conclusions from the data generated in the experiments. 3. communicate the experimental findings.
<u>MnTC Goal 3d</u>	evaluate societal issues from a natural science perspective, ask questions about the evidence presented and make informed judgments about science-related topics and policies.	<ol style="list-style-type: none"> 1. identify science-related questions and make judgments on physics-related issues.
<u>MnTC Goal 2a</u>	gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive and conscious of possible bias in the information selected.	<ol style="list-style-type: none"> 1. report on experimental data in laboratory experiments and draw conclusions based on interpretations of data. 2. use statistical analysis in the interpretation of data and identify sources of error in data-taking procedures. 3. demonstrate the ability to apply physics principles to explain everyday physical phenomenon.
<u>MnTC Goal 2b</u>	imagine and seek out a variety of possible goals, assumptions, interpretations and perspectives, which can give alternate meanings or solutions to given situations or problems.	<ol style="list-style-type: none"> 1. apply 'limits/special cases' in solving a physics problem. 2. demonstrate how alternate assumptions can lead to alternate solution to the same problem.
<u>MnTC Goal 2c</u>	analyze the logical connections among the facts, goals and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.	<ol style="list-style-type: none"> 1. solve physics problems that required logical connection between facts and assumptions pertaining to those problems. 2. be able to pick the relevant formulas that apply to a

		<p>situation or problem.</p> <p>3. draw conclusions based on the solutions to problems.</p>
<u>CS</u>	use unit vector notation.	<p>1. perform vector operations with vectors expressed in unit vector notation, including dot products and cross products.</p> <p>2. demonstrate the ability to use unit vectors notation in a variety of physics contexts.</p>
<u>CS</u>	apply calculus concepts to solve physics problems.	<p>1. use differential and integral calculus to solve physics problems.</p>
<u>CS</u>	apply Newton's laws to a variety of scenarios.	<p>1. demonstrate a conceptual understanding of how Newton's laws work.</p> <p>2. use Newton's laws to solve physics problems.</p>
<u>CS</u>	demonstrate an understanding of conservation laws.	<p>1. solve problems using the laws of conservation of energy, momentum, and angular momentum.</p>
<u>CS</u>	analyze equilibrium situations.	<p>1. apply the two conditions of equilibrium to solve physics problems.</p>

G. SPECIAL INFORMATION:

This course may require use of the Internet, the submission of electronically prepared documents and the use of a course management software program. Students who have a disability and need accommodations should contact Accessibility Services at the beginning of the semester. This information will be made available in alternative format, such as Braille, large print, or current media, upon request.

H. COURSE CODING INFORMATION:

Course Code C, B/Class Maximum 48, 24; Letter Grade

Revision date: 02/06/24

AASC Approval date: 12/17/19; 02/20/24

*These five MnTC Goals have been identified as Riverland Community College Core Themes. Every course in the Riverland Community College curriculum shall meet outcomes from one of these themes.

**These five MnTC Goals have been identified as Riverland Community College Disciplines. Riverland's MnTC courses also shall meet outcomes from a Discipline Area.

NOTE: The Minnesota Transfer Curriculum “10 Goal Areas of Emphasis” are reflected in the five required discipline areas and five core themes noted in the Riverland Community College program of study guide and/or college catalog.

*Riverland Community College Core Themes	MnTC Goal Number
Critical Thinking (CT)	2
Human Diversity (HD)	7
Global Perspective (GP)	8
Ethical and Civic Responsibility (EC)	9
People and the Environment (PE)	10

**Riverland Community College Discipline Areas	MnTC Goal Number
Communication (CM)	1
Natural Sciences (NS)	3
Mathematics/Logical Reasoning (MA)	4
History and the Social & Behavioral Sciences (SS)	5
Humanities and Fine Arts (HU)	6

Riverland