Three Rivers Community College
PHY K114 Mechanics
Syllabus
Spring 2011

Credit Hours: 4 **January 24-May 16, 2010**
Lectures: Mon at 9:00-11:45 AM **Labs: Mon *or* Wed at 1-2:40 PM**

Instructor	eMail Addresses	Phone	Office Hours
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Course Description: This course deals with the fundamental principles of classical mechanics using techniques of algebra and trigonometry. Topics covered include vectors, kinematics, translational and rotational equilibrium, torque, Newton's laws of motion, gravitation, work, power, energy, impulse, momentum and rotational motion.
Learning Outcomes: See last page of this syllabus.
Lecture Textbook (required): College Physics, 7th edition, by Wilson, Buffa and Lou
Lab Manual (required): Departmental Lab Experiment Book for Mechanics
Graphing Calculator (required): same as Precalculus course (TI-83, TI-84, TI-89 or TI-Nspire)
Prerequisite: High school algebra or MATH 095 **Co-requisite:** MATH 137
Vista blackboard: http://my.commnet.edu/ is the official location for assignments, grades, lecture notes and course information. The student will review their grades at this website to determine their ongoing grade status and to identify any missing materials that they need to make up.
Lab Reports: You work with lab partners in the lab, but you must each prepare your own lab report, due at the beginning of the next lab period. Unexcused late lab reports will have 2 pts per week deducted (2 pts if turned in during the first week after it is due, 4 pts if turned in during the 2nd week, etc.). Each of the 13 lab reports is worth 10 points. The lab reports contribute two letter grades towards your final grade.
Grade Point Totals: ***The five exams are worth 100 points each. The lab reports are worth 130 points. Your average is determined by the sum of all of these, divided by 630.***
Attendance: Attendance will be recorded for both lectures and labs; these will be reviewed by the Electric Boat apprenticeship administrators to ensure compliance with this program. Attendance for scheduled tests is mandatory; make-up exams will be provided to the student if approved by both the Electric Boat apprentice program administrators and the instructor.
Grading Policy: *On all tests and homework problems, use the **GECCA** format (described on page 3) to show the details of each step in solving the problem.* This supporting work demonstrates understanding, reinforces learning, and may result in partial credit if your final result is incorrect.

Grade equivalents:

A 93-100	B 83-86	C 73-76	D 63-66
A- 90-92	B- 80-82	C- 70-72	D- 60-62
B+ 87-89	C+ 77-79	D+ 67-69	F 59 or less

Questions? You can speak with me after class, or phone or email me with questions or to schedule a meeting.
Learning Resources: In addition to tutoring available at Electric Boat, Three Rivers offers tutoring (http://www.trcc.commnet.edu/Div_academics/TASC/TASC.shtml) and other learning resources.
Academic Integrity Policy: Cheating on an exam, handing in another's work as your own, or falsifying records of laboratory or other data is a violation of the Three Rivers Academic Integrity Policy and will be appropriately addressed as indicated in the Student Handbook (http://www.trcc.commnet.edu/Div_StudentServices/StudentPrograms/PDF/TRCC-StudentHandbook.pdf).
Disabilities: If you have a hidden or visible disability which may require special classroom or testing modifications or special accommodations, please see me as soon as possible (http://www.trcc.commnet.edu/Div_StudentServices/LDResources/LDResources.shtml)

Lecture Course Outline (subject to change)

Week	Topics (chapters)
24-Jan	Metric and English Systems; Dimensional Analysis; Problem Solving (ch 1); Motion in One Dimension: Distance, Speed and Velocity (ch 2)
31-Jan	Review for test; Motion in One Dimension: Acceleration; Free Fall (ch 2)
7-Feb	**Test 1 (ch 1 & 2);** Vector Components; Vector Addition; Motion in Two Dimensions (ch 3)
14-Feb	Projectile motion (ch 3)
21-Feb	**President's Day - No Class**
28-Feb	Review for test; Forces; Mass vs Weight; Newton's 1st Law: Inertia (ch 4)
7-Mar	**Test 2 (ch 2 & 3);** Newton's 2nd Law: Force and acceleration; Newton's 3rd Law: Action and Reaction (ch 4)
14-Mar	**Spring break – no classes**
21-Mar	Friction: Static and Kinetic (ch 4)
28-Mar	Review for test; Work Done by Constant and Variable Force (ch 5)
4-Apr	**Test 3 (ch 4);** Work-Energy Theorem; Kinetic Energy; Gravitational Potential Energy (ch 5)
11-Apr	Linear Momentum; Impulse; Conservation of Momentum (ch 6); Elastic and Inelastic Collisions (ch 6)
18-Apr	Review for test; Angular Measure, Speed and Velocity (ch 7)
25-Apr	**Test 4 (ch 5 & 6);** Centripetal Acceleration; Newton's Law of Gravitation; (ch 7)
2-May	Torque; Rotational Equilibrium; Center of Gravity; Moment of inertia; (ch 8)
9-May	Rotational Work & Kinetic Energy; Angular Momentum; Conservation of Angular Momentum (ch 8); Review
16-May	**Test 5 (ch 7 & 8)**

Laboratory Outline (subject to change)

Section 1	Section 2	Topics (chapters)
24-Jan	26-Jan	Density of a Cylinder
31-Jan	2-Feb	Graphing: The Discovery of Pi (π)
7-Feb	9-Feb	Graphing: Distance Versus Time for Rolling Objects
14-Feb	16-Feb	Vectors: The Force Table
21-Feb		President's Day – **No lab this day only**
28-Feb	23-Feb	Velocity in Two Dimensions: The Spring Gun
7-Mar	2-Mar	Equilibrium: The Bird on the Wire
14-Mar	16-Mar	Spring Break - **No lab this week**
21-Mar	9-Mar	Newton's Second Law: Timer version (Air Glider)
28-Mar	23-Mar	Newton's Second Law: g by Atwood's Machine
4-Apr	30-Mar	Newton's First Law: Friction
11-Apr	6-Apr	Energy Conservation in "Freefall"
18-Apr	13-Apr	Energy Conservation: The Pendulum
25-Apr	20-Apr	Torque: Second Condition of Equilibrium
2-May	27-Apr	Projectiles: The Baseball Lab
9,16-May	4,11-May	Review/excused makeup section

GECCA

(*Use GECCA for all tests and homework problems*)

Given: If possible, draw a picture. List the variables and constraints provided in the problem. Identify the answer needed (your goal).

Equation: Write the equation(s) to be used to solve the problem. Include the units.

Conversions: Convert any given values needed so that all units are consistent with the equation.

Calculations: Work through the calculations

Answer: Write the final answer

Learning Outcomes

The student will be able to:

- Read and follow instructions
- Assemble and use lab equipment peculiar to mechanics, including but not limited to force tables, air tracks, and rotational motion apparatus.
- Collect data in an organized fashion, noting precision of measurement and unit labels.
- Analyze data by creating graphs (by hand and by computer, with slope and intercept, if needed) and by correctly inserting data into equations.
- Round results and state measurements using the concepts of accuracy and precision.
- Calculate % error, where applicable.
- Explain sources of error in an experiment based on the limitations of the equipment used.
- Draw conclusions by relating their results to the appropriate physics principles.
- Use the SI system of measurements in solution of physics problems.
- Perform unit conversions and cancel units correctly during computations.
- Solve right triangles using the Pythagorean Theorem and trigonometry.
- Draw vectors and find their components using trigonometry.
- Add vectors graphically and by using components.
- Identify in a one-dimensional kinematics problem the known quantities and the unknown, choose the correct equation to solve for the unknown, and perform the algebraic manipulations needed to solve the equation.
- Solve problems involving free fall in one dimension and basic projectile problems.
- Draw a free body diagram, and state the cause of each of the forces.
- Resolve the forces of the free body diagram into components along given coordinate axes.
- Calculate mass from weight and the reverse in both SI and English units.
- Apply the first condition of equilibrium and solve the resultant equations for the unknowns.
- Find the resultant force on an object, and apply Newton's Second Law.
- Calculate the friction force for an object from the coefficient and the normal force.
- Calculate the work done on an object and relate it to the change in kinetic energy.
- Apply the conservation of mechanical energy (KE and GPE) to solve for initial or final speeds, or change in height.
- Apply the conservation of energy to calculate work done by friction.
- Apply the impulse-momentum equation to impact problems.
- Use momentum conservation to solve one-dimensional collision and explosion type problems.
- Compute angular velocity and acceleration in degree, radian and revolution units.
- Use the equations of circular motion to calculate initial or final angular velocities, angular acceleration or displacement.
- Calculate tangential velocity and acceleration from the angular quantities.
- Calculate centripetal acceleration and centripetal force, and apply the concepts to familiar situations (e.g., cars going around curves, twirling a yoyo on a string).
- Explain the source of "centrifugal force".
- Calculate torque on a beam subjected to more than one force.
- Apply the second condition of equilibrium to solve problems with noncurrent forces.
- Given moment of inertia, calculate angular acceleration.
- Given moment of inertia, calculate rotational kinetic energy.
- Use energy conservation to predict which of two same-radius objects will reach the bottom of an incline first.
- Given moment of inertia, calculate angular momentum.