JOHN A. LOGAN COLLEGE **M. Sawicki – FL 09**

PHY 205 **UNIVERSITY PHYSICS I** **5 cr. (4-2)**

COURSE DESCRIPTION:

PHY 205 is the first course in a standard two-semester calculus-based physics sequence that is offered at virtually all universities and colleges for engineering majors. PHY 205 covers mechanics, heat, and thermodynamics. Physics background is strongly recommended.

PREREQUISITES:

MAT 131

COURSE OBJECTIVES:

Upon successful completion of this course, students will be able to:

1. Demonstrate conceptual and working understanding of principles of mechanics and thermodynamics.
2. Apply these principles to qualitative and quantitative analysis of physical problems in real world applications.
3. Apply classical mechanics to the analysis of motion of particles and rigid bodies.
4. Make, use, and evaluate measurements of physical quantities.
5. Evaluate the effects of experimental growth and the ability to interpret trends.
6. Show international and ongoing nature of science.
7. Develop proper laboratory work habits and ethics and foster the ability to critically evaluate experimental results.

COURSE OUTLINE:

The following topics will be discussed:

Part I: Mechanics

1. Physics and Measurement
2. Motion in One Dimension
3. Vectors
4. Motion in Two Dimensions
5. The Laws of Motion
6. Circular Motion and Other Applications of Newton's Laws
7. Work, Energy and Energy Transfer
8. Potential Energy
9. Linear Momentum and Collisions
10. Rotation of a Rigid Object about a Fixed Axis

11. Angular Momentum
12. Static Equilibrium and Elasticity
13. Universal Gravitation
14. Fluid Mechanics

Part II: Oscillations and Mechanical Waves

15. Oscillatory Motion
16. Wave Motion
17. Sound Waves
18. Superposition and Standing Waves

Part III: Thermodynamics

19. Temperature
20. Heat and the First Law of Thermodynamics
21. The Kinetic Theory of Gases
22. Heat Engines, Entropy, and the Second Law of Thermodynamics

COURSE REQUIREMENTS:

1. There will be weekly homework assignments and weekly laboratory assignments. Late homework and late lab reports will not be accepted. In case of emergency, call/e-mail the instructor before the deadline to request an extension.
2. Homework will be web-based, and you will access your personalized problem sets and submit your answers using a Web browser. Detailed information will be provided by your instructor. The homework server and database are hosted at the Department of Physics of the University of Illinois at Urbana-Champaign, and your homework will be equivalent to a homework assigned to students in the University Physics course there.
3. There will be a weekly quiz related to the homework due this week. Partial credit will be given on incomplete solutions on quizzes.
4. Missed quizzes count as zeroes. There will be no make-up quizzes.
5. There will be no make-up labs.
6. Lowest quiz score and lowest lab grade in the semester will be dropped. If you miss one quiz/lab it will be counted as the quiz/lab to be dropped. Make arrangements in advance for school sponsored events. In case of medical emergency contact your instructor.

Student Success Center. Tutors may be obtained through the Student Success Center. Contact the staff in C219 if this service is desired. John A. Logan College will make reasonable accommodations for students with documented disabilities under Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990. Any student with a disability that may have some impact on work in this class, who feels she/he needs an accommodation, should make an appointment with the Coordinator of Services for Students with Disabilities on campus, Jennifer Frost, Room C219B, Ext.

8516. Before services can be provided, this advisor must determine eligibility and arrange appropriate academic adjustments. ***It is the student's responsibility to register in advance of a school term with this office and to turn in a schedule each term to ensure that there is every opportunity for success in this class.***

English Writing Center/Tutoring. For assistance with writing assignments in any college course, students are encouraged to visit "The Write Place" in Room E109. English instructors are available for one-on-one tutoring each semester during hours posted at the center.

Financial Aid. Students who receive financial assistance and completely withdraw from classes prior to 60% of the semester being completed (approximately 2-3 weeks after midterm) could be responsible to return a portion of their Federal Pell Grant award. Prior to withdrawing from courses, students should contact the Financial Aid Office.

Course Withdrawal Information. It is expected that you will attend this class regularly. If you stop attending for any reason, you should contact your advisor and withdraw officially to avoid the posting of a failing grade (an E) to your transcript. It is also advisable to discuss the situation with your instructor before dropping.

METHOD OF EVALUATION:

The final grade will be determined as follows:

20% quizzes
20% homework assignments
20% laboratory work, (But you must have a passing grade from the laboratory work to pass the course.)
20% midterm exam
20% final exam

Letter grade will be assigned by a scale similar to the following:

A: 100%-88%
B: 87%-75%
C: 74%-64%
D: 63%-51%
E: 50% or less

METHOD OF PRESENTATION:

Lecture 4 hours per week, and supervised laboratory work 2 hours per week. Much of the lecture will involve working practice problems. Labs are designed to provide hands-on exposure to concepts discussed during the lecture.

TEXT:

Physics for Scientists and Engineers – 7th Edition, Raymond A. Serway and John W. Jewett. ISBN 0534408427

Note: Older editions of Serway and Jewett, Serway and Beichner or Serway will work as well, since the homework is Web-based and not textbook-specific.

Lab Manual: Mik Sawicki, *"Experiments in Mechanics"*

INSTRUCTOR: Dr. Mik Sawicki, Professor of Physics
Office: G104-D
Office Hours: as posted
Phone: Extension #8292
E-mail: mikolajsawicki@jalc.edu

DATE: Fall, 2009

John A. Logan College Telephone Numbers

Carterville and Williamson County	985-3741 (operator)
	985-2828 (direct extension access)
Carbondale and Jackson County	549-7335 (operator)
	457-7676 (direct extension access)
Du Quoin	542-8612
West Frankfort	937-3438
Crab Orchard, Gorham, & Trico areas	1-800-851-4720
TTY (hearing-impaired access)	985-2752

John A. Logan College does not discriminate on the basis of race, religion, color, national origin, disability, age, sexual orientation, or gender orientation.

Upon successful completion of this course, the student will meet or exceed the expectations defined by the ISBE Content Area Standards for Educators, Secondary and Special Education, Science – A Common Core of Standards [27.140]

Knowledge Indicators – *The competent science teacher*:

1. Understands assumptions, processes, purposes, requirements, and tools of scientific inquiry. (Core Science: 1A)
2. Understands mathematical processes and tools for collecting, managing, and communicating information. (Core Science: 1B)
3. Understands different approaches to conducting scientific investigations. (Core Science: 1C)
4. Understands the processes, capabilities, limitations and implications of technology and technological design and redesign. (Core Science: 2A)
5. Understands technology and technological design as the use of tools throughout human history. (Core Science: 2B)
6. Understands the principle of conservation as it applies to mass, charge, momentum, and energy. (Core Science: 5B)
7. Understands the characteristics and relationships among thermal, acoustical, radiant, chemical, and mechanical energies. (Core Science: 5D)
8. Understands the concepts and interrelationships of position, time, velocity, and acceleration. (Core Science: 6A)
9. Understands the concepts and interrelationships of force (including gravity and friction), inertia, work, power, energy, and momentum. (Core Science: 6B)
10. Understands the nature and properties of mechanical and electromagnetic waves. (Core Science: 6D)
11. Understands that the nature of science is a human endeavor characterized as tentative, public, replicable, probabilistic, historic, unique, holistic and empirical. (Core Science: 9A)
12. Understands the definitions of hypotheses, predictions, laws, theories, and principles and the historic and contemporary development and testing of them. (Core Science: 9B)
13. Understands research and reports examples of hypotheses, predictions, laws, theories, and principles, and valid and biased thinking. (Core Science: 9C)
14 Understands the basis for safety practices and regulations in the study of science. (Core Science: 9D)
15. Understands the ways that science and technology affect people's everyday lives, societal values, and systems; the environment; new knowledge; and technologies throughout history. (Core Science: 10A)
16. Understands the processes and effects of scientific and technological breakthroughs and their effect on other fields of study, careers and job markets. (Core Science: 10B)
17. Understands connections within and among the traditional scientific disciplines. (Core Science: 11A)
18. Understands fundamental comparability of the processes shared within and among the traditional scientific disciplines. (Core Science: 11B)

19. Understands fundamental mathematical language, knowledge and skills. (Core Science: 11C)
20. Understands fundamental relationships among the sciences and the social sciences. (Core Science: 11D)

Performance Indicators – *The competent science teacher*:

1. Plans and conducts scientific investigations using appropriate tools and technology. (Core Science: 1D)
2. Applies mathematical and statistical methods to collect, analyze, and communicate results of investigations. (Core Science: 1E)
3. Displays, illustrates, and defends the results of an investigation. (Core Science: 1F)
4. Uses evidence and logic in developing proposed explanations that address scientific questions and hypotheses. (Core Science: 1G)
5. Identifies real-world problems or needs to be solved through technological design. (Core Science: 2C)
6. Addresses a problem situation by identifying a design problem, proposing a design solution, implementing the solution, evaluating the solution, revising the design upon evaluation, and communicating the design and the process. (Core Science: 2D)
7. Identifies the inquiry process in the investigation of past, current, and potential technological designs. (Core Science: 2E)
8. Analyzes the properties of materials in relation to their chemical or physical structures and evaluate uses of the materials based on their properties. (Core Science: 5E)
9. Explains conservation of mass and energy and explains interactions of energy with matter, including changes in state. (Core Science: 5F)
10. Demonstrates the ability to use instruments or to explain functions of the technologies used to study matter and energy. (Core Science: 5I)
11. Describes and predicts motions of bodies in inertial and accelerated frames of reference and in one and two dimensions in a physical system with association to the basic theories of force and motion. (Core Science: 6E)
12. Analyzes and predicts motions and interactions involving forces within the context of conservation of energy and/or momentum. (Core Science: 6F)
13. Describes the effects of gravitational forces in real life situations. (Core Science: 6G)
14. Analyzes and predicts the behavior of mechanical waves under varying physical conditions. (Core Science: 6H)
15. Demonstrates abilities to use instruments or to explain functions of the technologies used to study force and motion. (Core Science: 6I)
16. Researches and reports examples of creative and critical thinking skills in scientific research and technological innovation. (Core Science: 9E)
17. Researches and reports examples of predictions, hypotheses, and theories in both valid and biased scientific thinking. (Core Science: 9F)

18. Researches and reports examples of the development of science through time and the impact of societal values on the nature of science. (Core Science: 9G)
19. Documents and practices safety rules and shows evidence of their necessity in the investigation of science. (Core Science: 9H)
20. Demonstrates the ability to use instruments and is able to explain functions of appropriate safety equipment used to assure and implement safe practices. (Core Science: 9I)
21. Evaluates the efficacy of criteria for determining the effects of policies on local, state, national, and global environmental and technological issues. (Core Science: 10C)
22. Investigates and evaluates the credibility of scientific claims made in the media, during public debates, or in advertising or marketing campaigns. (Core Science: 10D)
23. Investigates issues by defining and clearly articulating the scientific, technological, and societal connections to be investigated, as well as evaluating the consequences, implications, and potential options for resolution. (Core Science: 10E)
24. Identifies and describes the application of the unifying concepts in real-life situations. (Core Science: 11E)
25. Utilizes the unifying concepts from science, as well as concepts from mathematics, the social sciences, and other disciplines in his or her teaching. (Core Science: 11F)
26. Expresses phenomenological relationships in the language of mathematics, solving simple algebraic equations, using scientific notation, constructing and interpreting graphs and using probabilities. (Core Science: 11G)