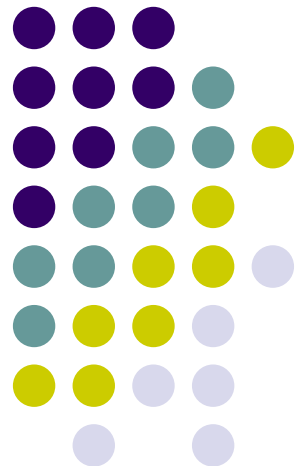
Physics for Scientists and Engineers

Course organization

and

Introduction



PHYS 205A: University Physics I

Prerequisites: MATH 150 with grade of C or better

Instructor: Dr. Andrei Kolmakov

Office: Neckers 478

e-mail: akolmakov@physics.siu.edu

phone: (618) 453-5212

Lectures: MWF 9:00 PM - 9:50 PM

Office hours: MWF 11:00 AM - 13:00 PM (and by appointment)

Webpage of this course:
http://www.physics.siu.edu/people/kolmakov/

Syllabus, Lectures, Assignments & Solutions, Grades

Check posted information periodically to be aware of news which may not be announced in class yet.

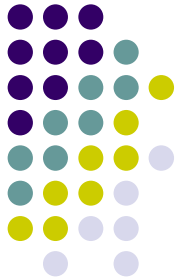
Help Desk: The Physics Help Desk provides free tutoring in Neckers 240 G. Please, check the schedule posted on the Physics website

http://www.physics.siu.edu/courses/helpdesk.htm or call 453-2643.

FALL 2008 – PHYSICS HELP DESK

OUTSIDE NECKERS 240G

(Call 453-2643 with any problems) revised 8/14/08



Go to TA's webpage **http://www.physics.siu.edu/people/students/TA.htm** to contact Help Desk instructor

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8-9 am					
9-10		Basynat 9-N	Basynat 9-11	Sharma 9-11:30	
10-11					
11-12 pm	Lamsal 11:30-1:30		Lamsal 11:30-3:30		Lamsal 11:30-3:30
12-1				Leuty N-3	
1-2	Leuty 1:30-3:30				
2-3					
3-4					

Course organization:

Textbook: ***Physics for Scientists and Engineers*** (7th Edition), by R.A. Serway and J. W. Jewett, Jr. Thomson Brooks/Cole.

1) Lectures & in-class problems: Lectures will normally be in PowerPoint presentation format and will be posted on the website. There will be in-class problems assigned to practice the concepts presented in class.

2) Homework:

● Homework problems will be assigned close to completion of each chapter. ●The solutions of the problems will be discussed in the class and also be posted on the webpage; ●*These will be collected for grade and will count towards your final grade.*

3) There will be 4 (four) exams during the semester and **a comprehensive final exam.** *The dates and topics for the mid-semester exams will be announced in class and on the webpage. They will be administered during lecture hours.* ●The lowest score of the four exams will be dropped automatically. If you miss an exam for personal reasons, it will be counted as your dropped exam.● Problems in the exams will be based on homework assignments and/or problems discussed in class. ●The exams will combine conceptual questions with problems. Showing all work will be required to get full credit in each question/problem.●You will not be allowed to consult the textbook or notes during the exams. You are allowed to generate your own equation sheet which cannot be longer that one page (single side).●No make up exams will be given. ●The final exam will be given on **Wed., Dec 10 07:50-09:50a.m. Neckers 440**

Grading

Last Day to drop without a grade: 8-th week plus one day from the beginning of the course

Grading:

Your course grade will be determined by your performance in the exams. These partial grades will be weighted as follows:

Homework: 10 %

Midterm Exams (3): 60 %

Final Exam: 30 %

Final Grade:

90 % - 100 % = A

80 % - 89.9 % = B

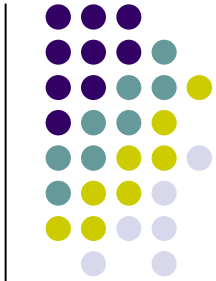
70 % - 79.9 % = C

55 % - 69.9 % = D

0 % - 54.9 % = F

Academic dishonesty and student conduct code: We will follow this code as posted in http://www.siu.edu/~docedit/policies/conduct.html

Introduction:

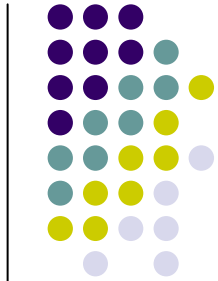


- Fundamental Physics (*distinguish from Applied one*)
  - Searches for the fundamental principles governing our Universe
  - Serves as a foundation of other physical sciences (astronomy, chemistry, biology, geology etc)

  Divided* into five major areas
  - Classical Mechanics (slow motion of macroscopic objects)
  - Relativity (motion of any objects at any sped)
  - Thermodynamics (heat, temperature, useful work, statistical approach)
  - Electromagnetism (electricity, magnetism, electromagnetic waves)
  - Optics (propagation and interaction of light** with matter)
  - Quantum Mechanics (matter at small scale)

* Remember that the division is artificial – the Nature does not know these borders
** Not only visible light

Historical prospective: Classical vs Modern Physics

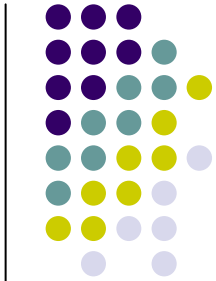


- Classical physics
  - Developed before 1900
  - Mechanics and electromagnetism are basic to all other branches of classical and modern physics
  - Our study will start with Classical Mechanics
    (Also called Newtonian Mechanics or Mechanics)
- Modern physics
  - From about 1900 to the present
  - Was a result of growing amount of unexplained experiments

Classical Physics Overview

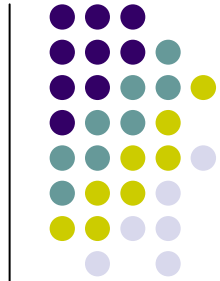
- Classical physics includes principles in many branches developed before 1900
- Mechanics
  - Major developments by Newton, and continuing through the 18th century
- Thermodynamics, optics and electromagnetism
  - Developed in the latter part of the 19th century
  - Apparatus for controlled experiments became available

Modern Physics



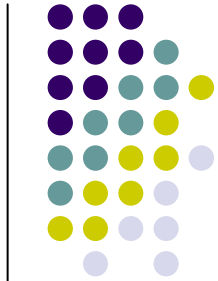
- Began near the end of the 19th century
- Phenomena that could not be explained by classical physics
- Includes theories of relativity and quantum mechanics
  - Phenomena at extremely small and extremely large distances and time intervals, nuclear and elemental particles theory
  - Cosmology, origin and evolution of the Universe
  - Search for Grand Unification Theory

Special Relativity



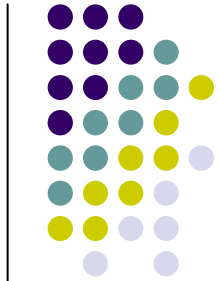
- Correctly describes motion of objects moving near the speed of light
- Modifies the traditional concepts of space, time, and energy
- Shows the speed of light is the upper limit for the speed of an object
- Shows mass and energy are related

Quantum Mechanics



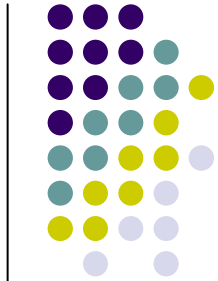
- Formulated to describe physical phenomena at the atomic level
- Led to the development of many practical devices

Objectives of Physics



- To find the limited number of fundamental laws that govern natural phenomena. (We don't know why but it works!)
- Express the laws in the language of mathematics
  - Mathematics provides the bridge between theory and experiment
- To use these laws to develop theories that can predict the results of future experiments

Scientific Method at Work: Theory vs Experiments



- Complement each other:
  - Theory explains available experimental data and predicts new
  - Experiment checks new theory
- When a discrepancy occurs, theory has to be modified to provide a more general theory

Conclusion: the correct measurements are the only way to “dig” new knowledge.
Comment: It is getting harder and harder to do that…