# Syllabus for Classical Physics I, PHYS 341, Fall 2014

# CRN: 77555, F01

## MWF 2:15-3:15 PM, REIC 207 (Lecture)
### T 11:30-12:30 PM, REIC 207 (Recitation)


**Instructor:** Ataur R. Chowdhury

**Office:** REIC 118

**Office Hours:** MWF 10:30-12:00 Noon, or feel free to drop in whenever I am in my office.

**Contact:** Phone (907) 474-6109
Fax (907) 474-6130
Email archowdhury@alaska.edu


**Prerequisites:** PHYS 211X; PHYS 212X; Phys 220; PHYS 301; or permission of instructor**.**

**Texts:** **Required:** *Classical Mechanics* by J R. Taylor, 1st Edition, University Science Books.

**Reference Texts:**
1. *Classical Dynamics of Particles and Systems* by Marion & Thornton, Brooks/Cole (1995).
2. *Mechanics* by K. R. Symon, 3 rd Edition, Prentice Hall.
3. Introduction to Classical mechanics by A. Arya, Prentice Hall (1998).
4. *Classical Mechanics* by H. Goldstein, Addison-Wesley (2002) (a graduate level text).

**Course Objectives:** To acquire a basic understanding of the fundamentals of dynamical motion of objects in light of the Newton's laws and Lagrange's concepts.

**Student Learning Outcomes:**

1. Students should be able to understand the logistics of static and dynamic motion of objects.
2. Students should be able to express the essential elements of object's motion in terms of Newton's laws and using Lagrange's concepts.
3. Students should be able to set up equations of motion and be able to solve for relevant quantities of interest.
4. Students should be able to simulate approximate motion of objects where analytical solutions are not possible.
5. Students should understand the fundamentals of all physical concepts involving the motion of objects.

**Course Outline:** Newtonian mechanics, conserved mechanical quantities, motion of system of particles, rigid body statics and dynamics, moving and accelerated coordinate systems, rigid body rotations and Lagrangian mechanics.

# Syllabus for Classical Physics I, PHYS 341, Fall 2014

# CRN: 77555, F01

**Credits:** 4 credits: 3 hr. of lecture, and 1hr. of tutorial per week.

**Course Requirements/ Policies:**

Class Attednence/Participation:
For a better understanding of the course material attendance and participation in classroom activities are very important. This particular course is generally regarded as one of the founding courses that deal with the fundamentals of classical physics, and it is highly expected that the students will commit themselves to attend the class regularly. There will be supplemental materials for this course and the students will be held responsible for all the materials that will be brought in from outside the text. The students will be expected to participate in class activities, and take part in meaningful discussion and ask questions to better comprehend the subject material.

Tutorial Session:
One hour per week (T 11:30-12:30 PM, RECI 207) will be devoted to doing problems not included in the homework. Both the instructor and students will take part in solving a pre-selected set of problems during this session. Students may also bring in subjects materials for further discussion and clarification during this session. Attendance at this session is required. This session is designed to promote a better understanding of the subject and will not be a part of the grade

Homework:
On the average, 6-8 problems/exercises/questions will be assigned each week on Fridays. The homework will be due back at the beginning of class the following Friday. NO LATE HOMEWORK WILL BE ACCEPTED. NO EXCEPTIONS (barring emergencies and extreme situations). Group work is highly encouraged for solving problems, and for additional help with the homework the students are most welcome to consult the instructor during the office hour or any other time by prior appointment. Any homework you submit should reflect you own best effort. Copying of homework is absolutely not acceptable and will result in a grade of zero for the assignment.

Quizzes: There will be one quiz every week of the semester on Fridays, except the first week and week of midterm and final. These quizzes will be administered during the last 20 minutes of the class and are designed to test students understanding of the subject material covered during the preceding week. The quiz may include problems similar to the homework and may also include 'intuitive' question pertaining to the subject materials. Of all the quizzes only nine best will be considered for grading.

Examinations:
There will be a midterm examination (October 24, Friday, 2:15-3:15 PM) and a final comprehensive examination (December 17, Wednesday, 1:00-3:00 PM) for this course.

# Syllabus for Classical Physics I, PHYS 341, Fall 2014

# CRN: 77555, F01

Examinations will consist of, in most part, problems similar to those in the homework and those worked out in class. Midterm will cover the material covered in class and homework prior to the date of test, and the final will cover material covered in chapters 1-10, with more weight on material covered after the midterm.

**Grading Policy:**

| | |
|---|---|
| Homework | 25% |
| Prticipation | 5% |
| Midterm | 20% |
| Quiz | 20% |
| Final | 30% |
| Total | 100% |

The final grading for this course will be based on a curve, the average of which is usually taken to be the break-point of letter grade B and C, and the standard deviation of the grade point distribution will separate subsequent letter grades. No plus-minus letter grades will be given for this course.

**Academic Honesty**

UAF expects and requires academic honesty from all members of the University community, and takes any act of plagiarism and cheating seriously. It is expected that all assignments, including homework and reports, that are turned in for this course must the original work of the individual student. Failure to comply with this policy will result in penalty as stipulated under UAF regulations.

**Disabilities Services**

The UAF Office of Disability Services implements the Americas with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Any student who may need assistance with disabilities, should feel free to contact the instructor or directly to the Office of Disabilities Services (208 WHIT) by calling 907- 474-5655, or through email: uaf-disability-service@alaska.edu.

## Tentative Schedule

Lecture, Reading, Quizz and Exam

| Dates | Topics | ReadingAssignment |
|---|---|---|
| Sept. 5 | introduction, overview, pop quiz, | |

# Syllabus for Classical Physics I, PHYS 341, Fall 2014

## CRN: 77555, F01

| | | | |
|---|---|---|---|
| Sept. | 8 | review of mechanics | Ch 1: sections 1-2 |
| | 10 | Newton's laws, inertial frame | Ch 1: sections 3-4 |
| | 12 | conservation of momentum | Ch 1: section 5 |
| | | **Quiz # 1** | |
| | 15 | motion in two-dimensions | Ch 1: sections 6-7 |
| | 17 | projectile motion | Ch 2: sections 1-3 |
| | 19 | air resistance | Ch 2: sections 3-4 |
| | | **Quiz # 2** | |
| | 22 | motion of charge particle in B field | Ch 2: sections 5-7 |
| | 24 | momentum conservation, rocket | Ch 3: sections 1-2 |
| | 26 | center of mass, angular momentum | Ch 3: sections 3-4 |
| | | **Quiz # 3** | |
| | 29 | systems with many particles | Ch 3: sections 4-5 |
| Oct. | 1 | kinetic energy, work | Ch 4: sections 1-2 |
| | 3 | potential energy, time dependent-potential | Ch 4: sections 3-5 |
| | | **Quiz # 4** | |
| | 6 | one-dimensional system, central force | Ch 4: sections 6-8 |
| | 8 | energy of a multiparticle system | Ch 4: sections 9-10 |
| | 10 | simple harmonic motion | Ch 5: sections 1-2 |
| | | **Quiz # 5** | |
| | 13 | damped oscillations | Ch 5: sections 3-5 |
| | 15 | resonances | Ch 5: sections 6-7 |
| | 17 | calculus of variations | Ch 6: sections 1-2 |
| | | **Quiz # 6** | |
| | 20 | Lagrange's equations | Ch 7: sections 1-2 |
| | 22 | Lagrange's equations with constraints | Ch 7: sections 3-4 |
| | 24 | **Midterm Exam** (in class) | Ch 1-7 |
| | 27 | generalized coordinates, conservation laws | Ch 7: sections 6-7 |
| | 29 | Lagrange multipliers | Ch 7: sections 9-10 |

# Syllabus for Classical Physics I, PHYS 341, Fall 2014

## CRN: 77555, F01

| | | | |
|---|---|---|---|
| | 31 | more on Lagrange applications<br>**Quiz # 7** | Ch 7: sections 1-10 |
| Nov. | 3 | central force | Ch 8: sections 1-2 |
| | 5 | CM coordinates, equations of motion | Ch 8: sections 2-3 |
| | 7 | one-dimensional problems<br>**Quiz # 8** | Ch 8: sections 3-4 |
| | 10 | Kepler orbits | Ch 8: sections 5-7 |
| | 12 | changes of orbits | Ch 8: section 8 |
| | 14 | accelerating frame<br>**Quiz # 9** | Ch 9: sections 1-2 |
| | 17 | rotating frame | Ch 9: sections 3-4 |
| | 19 | Newton's law, centrifugal force | Ch 9: sections 5-6 |
| | 21 | Coriolis force<br>**Quiz # 10** | Ch 9: sections 7-8 |
| | 24 | Foucault pendulum, Coriolis acceleration | Ch 9: sections 9-10 |
| | 26 | rotation about a fixed axis | Ch 10: sections 1-2 |
| | 28 | **Thanksgiving break** (No class) | |
| Dec. | 1 | inertia tensor, principle axis | Ch 10: sections 3-4 |
| | 3 | eigenvalue equations, precessing top | Ch 10: sections 5-6 |
| | 5 | Euler's equations<br>**Quiz # 11** | Ch 10: sections 7-8 |
| | 8 | Euler's angles, spinning top | Ch 10: sections 9-10 |
| | 10 | makeup lecture | |
| | 12 | review for final<br>**Quiz #12** | |
| | 17 | **Final Examination** (chapters 1-10), 1-3 PM, REIC 207 | |

# Syllabus for Classical Physics I, PHYS 341, Fall 2014

# CRN: 77555, F01

## Initial Questionnaire

NAME:_____ Student #_____

Academic Major(s)_____

College Physics and Mathematics courses completed:

| |
|---|
| |

Physics and Mathematics courses this semester:

| |
|---|
| |