Welcome to PHYA10S

"Physics for Physical Science - I"

- **Instructors: & Course Coordinator:** Prof. Salam Tawfiq
- Office#: SW-511 & Tel: 416- 287-7243
- E-mail: tawfiq@utsc.utoronto.ca
- **High Energy Phys, (PHYA10S** & PHYB21S)
- **Prerequisite: 12U - SPH4U (Grade 12 Physics) and Calculus and Vectors (MCV4U) and Advanced Functions (MHF4U)**
- **Corequisite: MATA30H3 or MATA31H3**

Course Description: The course is intended for students in physical, environmental and mathematical sciences. The course introduces the basic concepts used to describe the physical world with mechanics as the working example. This includes mechanical systems (kinematics and dynamics), energy, momentum, conservation laws, waves, and oscillatory motion.

Who can help you!

- **TAs in Practicals**
- ***PHYSICS AID CENTER***
- **Facilitated Study Groups (FSG)**

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- ***Instructor (during office hours)***

Administration & Syllabus

- Office hours: ***(Tuesday 12.00-13.00 and Friday 12.00-13.00 or by appointment)***
- E-mails**: Use U of T e-mail**. **Answer in 48h** (Weekdays).
- ***Students with a disability*: Register with the AccessAbilities Center**
- **We use iClickers**:2% Bonus (Need to answer at least 75% of questions in class with at least 50% correct) {enter your ***UTORID*** & **name as on ROSI** to register your clicker on **Blackboard**}
- **Drop Out! (See Coordinator)**

Syllabus

- Text Book: **"Physics for Scientists & Engineers" 4th ed, Randall Knight** + Mastering Physics & **Student Workbook** (optional)
- Homework (about 10 Assignments)
  - **On line (Mastering Physics) for 1% & more practice.**
  - **Course ID: PHYA10S2018 (enter your UTOR id)**
  - **No late Assignment accepted**
- web site: (Admin, **Notes, Quizzes & Tests….etc)** on **Blackboard (BB)**

Syllabus Cont…

- Practical: Run weekly. *(**Check schedule** ., start Monday 15th)*
  - **Mandatory! You are encouraged to attend!**
  - **Go to your practical group!**
- Labs
  - ***Three practical sessions*** **will be dedicated as Labs …**
  - **You will submit TWO Lab reports (one as a group & one individual)**
  - **Missing Lab (with acceptable written reason) make up arrangement possible within the same week!**

Syllabus cont….
Marking Scheme (tentative):

- **Practical: 25% (2 reports 8%, Practical Notebook 12%, Quizzes: 5%)**
- **Term test: 30% (2 term tests; 15% each)**
- **Final exam: 45%**

PHYA10-2016 Grades

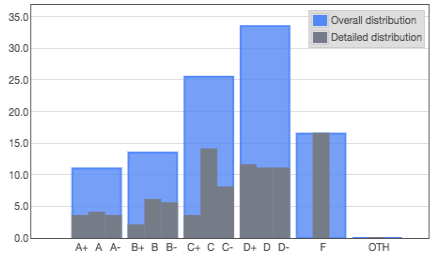
Original Grade Distribution

A	11%	B	13.5%	C	25.5%	D	33.5%
A+	3.5%	B+	2%	C+	3.5%	D+	11.5%
A	4%	B	6%	C	14%	D	11%
A-	3.5%	B-	5.5%	C-	8%	D-	11%

F	16.5%	OTH 0%	
F	16.5%	OTH 0%	

Average	Median
60.30 %	60 %

Class average excluding exam no shows: 61.92%
Fails excluding exam no shows: 12.11%



Syllabus Cont…

- **Exam &Tests (Don't memorize equations)**
  - **You will prepare a *One page Formulae Sheet* for the 2 Tests & Final Exam**
  - **Quizzes: multiple choice questions + short answer**
  - **Tests: multiple choice questions + short open response + Problem solving**
- **Final Exam: (Cumulative)**

  multiple choice + short open response + problems

Syllabus Cont…

- To succeed: Integration of Lecture/Textbook/Practical
- Extra Help: Tutors, FSG & Instructor . Also PHYSICS AID CENTER
- Coverage (Topics from): ***Tentative Schedule !***
  - – **Mechanics:**
    - ➢ Ch 1-4 Kinematics — 1.5 week
    - ➢ Ch 5-8 : Dynamics — 2 weeks
  - – Ch 9-11: Conservation Laws — 2.5 weeks
  - – **Applications:**
    - ➢ Ch 12 Rotation — 2.5 weeks
    - ➢ Ch 15 (16?) Oscillation — 2 weeks

Syllabus Cont…

- **Answering Questions**
  - – Answer in complete sentences
  - – "Yes" or "No" is never a complete answer (only if you are asked to do so)
  - – Explain why
- ***Extra Marks:*** **(Be creative!)**

  Original (new) solutions!

Is this course Difficult ?

- YES & NO!!!
- IT IS CHALENGING!

Foundation+
Problem Solving Skills

Syllabus Cont…

- **Solving Problems (Check the textbook)**
  - **Show basic equation**
  - **Include drawing and units**
  - **Solve algebraically**
  - **Show substitution of numbers (at the end)**
  - **Use words & be Organized**
  - **Only 80% points for correct answer and minimal work**
  - **Communicate!**

Role of Mathematics

- Crucial for advancing frontiers of Physics
- Crucial for developing a facility for using Physics
- ***Must know algebra & Calculus !***
- ***MATA30H3 or MATA31H3 is a co-requisite***
  - Will review some basics (if needed) in practical as we go along

Solving Problems

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Problem Solving Strategy

- **Each profession has its own specialized knowledge and patterns of thought.**
- **The knowledge and thought processes that you use in each of the steps will depend on the discipline in which you operate.**
- **Taking into account the specific nature of *physics*, we choose to label and interpret the *five steps* of the general problem solving strategy as follows:**

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Problem Solving Strategy

- A. Everyday language:
  1) Make a sketch.
  2) What do you want to find out?
  3) What are the physics ideas?
- B. Physics description:
  1) Make a physics diagram.
  2) Define your variables.
  3) Write down general equations.
- **C. Combine equations:**
  1) Select an equation with the target variable.
  2) Which of the variables are not known?
  3) Substitute in a different equation.
  4) Continue for all of the unknown variables .
  5) Solve for the target variable.
  6) Check units.
- **D. Calculate solution:**
  1) Plug in numerical values.

E. Evaluate the answer:
1) Is it properly stated?
2) Is it reasonable?
3) Answered the question asked?

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Problem Solving Strategy, Step A

A. Everyday language description:

In this ***step*** you develop a ***qualitative description*** of the problem.

- Visualize the events described in the problem by ***making a sketch***. The sketch should indicate the different objects involved and any changes in the situation (e.g. changes in force applied, collisions, etc.) First, identify the different objects that are relevant to finding your desired category. Next, identify whether there is more than one stage (part) to the behavior of the object during the time from the beginning to the end that is relevant for what you are trying to find out. Things that would indicate more than one part would include key information about the behavior of the object at a point between start and end of movement, collisions, changes in the force applied or acceleration of an object.
- Write down a simple statement of ***what you want to find out***. This should be a specific physical quantity that you could calculate to answer the original question.
- Write down verbal descriptions of ***the physics ideas*** (the type of problem). Identify the physics idea for each stage of each object. If the physics idea is a vector quantity (motion, force, momentum, etc.) identify how many dimensions are involved.

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Problem Solving Strategy, Step B

B. Physics description:

- In this ***step*** you use your qualitative understanding of the problem to prepare for the ***quantitative solution***.
- First, simplify the problem situation by describing it with a diagram in terms of simple physical objects and essential physical quantities. ***Make a physics diagram***. You will need a diagram for each physics idea for each object, and possibly one for each stage and for each dimension.
- ***Define your variables*** (make a chart) of know quantities and unknown quantities. Identify the variable you will solve for. Make sure variables are defined for each object, stage, idea and dimension. Pay attention to units, to make sure you have the right kind of units for each type of variable.
- Using the physics ideas assembled in ***A-3*** and the diagram you made in ***B-1***, ***write down general equations*** which specify how these physical quantities are related according to the principles of physics or mathematics.

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Problem Solving Strategy, Step C

C. Combine equations:

- In this step you translate the physics description into a ***set of equations*** which represent the problem mathematically by using the equations assembled in ***step 2***.
- ***Select an equation*** from the list in B3 that contains the variable you are solving for (as specified in B2).
- Identify ***which of the variables*** in the selected equation ***are not known***.
- For each of the unknown variables, select another equation from the list in B3 and solve it for the unknown variable. Then ***substitute the new equation in*** for the unknown quantity in the original equation.
- ***Continue*** steps 2 & 3 ***until all of the unknown variables*** (except the variable you are solving for) ***have been replaced or eliminated***.
- ***Solve for the target variable***.
- ***Check*** your work by making sure the ***units*** work out.

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Problem Solving Strategy, Steps D & E

D. Calculate solution:

- In this step you actually execute the solution you have planned.
- **Plug in numerical values** (with units) into your solution from ***C-5***.

E. Evaluate the answer:

- Finally, check your work.
- Is it ***properly stated***? Is it ***reasonable***?
- Have you actually **answered the question asked**?

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Problem Solving Strategy

- Consider each ***step*** as a ***translation*** of the previous step into a slightly different language.
- You begin with the full complexity of ***real objects*** interacting in the real world and through a ***series of steps*** arrive at a simple and precise ***mathematical expression***. The five-step strategy represents an effective way to organize your thinking to produce a solution based on your best understanding of physics. The quality of the solution depends on the knowledge that you use in obtaining the solution.
- Your use of the strategy also makes it easier to look back through your solution to check for incorrect knowledge and assumptions. That makes it an ***important tool*** for ***learning physics***.
- ***If you learn to use the strategy effectively, you will find it a valuable tool to use for solving new and complex problems.***

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