PHYS 121: General Physics I: Mechanics
SYLLABUS AND COURSE CALENDAR: 16 January 2024

Syllabus and Summary Information:

Content: **Calculus-based Introductory Newtonian Classical Mechanics:**
Kinematics, Velocity, Acceleration, Vector Motion, Cartesian Unit Vectors,
Circular Motion, Centripetal Acceleration, Projectile Motion,
Particle Dynamics, Newton's Laws of Motion, Free-Body Diagrams,
Contact Forces, Tension, Pulleys, Friction, Spring Forces,
Work, Path integrals, Kinetic energy, Energy & Momentum Conservation,
Classical Work-Energy Theorem, Classical Impulse-Momentum Theorem,
Systems, Center-of-Mass, Elastic & Inelastic Collisions,
Rotational Motion, Conservation of Angular Momentum, Torque,
Simple Harmonic Motion, Damped Oscillators, Harmonic Waves,
Gyroscopes, Gravity, Relativity, some Astrophysics, some Cosmology

Prerequisites: Some calculus: One of these (concurrent) MATH 121 or MATH 125
or one year of high school calculus

Modality: Lectures: In-person (all lectures will be video recorded).
Labs: In-person. Exams: In-person. Homework submitted via Canvas.

Course Policies: See Week #00 on Canvas Modules for details on course policies including
accommodation, academic integrity, and COVID-19 policies.

Schedule: **Lectures:** MWF 11:40 to 12:30 PM in Strosacker Auditorium, Case Quad
All lectures will be video recorded for asynchronous access.

Labs: every other week as scheduled. Rock 4th Floor. See Canvas for details.

Syllabus and Summary Information Continued:

Instructors: (team of three)	Corbin Covault, Rockefeller 207 (2nd floor) Phone: 216-368-4006 (office) or 216-339-3861 (mobile), E-mail: **cec8@case.edu**

Prof. Mhlambululi Mafu, Rockefeller 124
E-mail: **mxm1625@case.edu**
Office Hours: Mondays: 3:00-4:30 and Fridays 3:00 to 4:30

Online Text (Free!):　　*Physics 121 Online Notes* by Robert W. Brown

Optional Texts:　　*Physics for Engineers & Scientists, V1, 3rd Ed.*
　　　　　　　　　　　　by Ohanian & Markert ISBN: 978-0393930030
　　　　　　　　　　The Cartoon Guide to Physics
　　　　　　　　　　　　by Gonick and Huffman ISBN: 978-0062731005

Homework:　　Worth **15%** of your grade, assigned weekly,
　　　　　　　usually due Mondays, 11 PM submitted and graded via *Canvas*.

　　　　　　　Written Homework solutions by instructor, will be posted online.
　　　　　　　Eleven weekly homework assignments, the lowest score ***will be dropped***.
　　　　　　　No late homework will be accepted.

Optional Bonus Clicker Participation:　　Iclicker+ or Iclicker2, during lectures,

Optional Bonus Online Homework:　　*The Expert TA*, software license: Register at:
　　　　　　　http://goeta.link/USW37OH-2495AD-33O

Grade Breakdown:

Homework	15% (lowest HW score dropped)
1st hour exam (Fri Sep 29)	5%
2nd hour exam (Fri Oct 20)	10%
3rd hour exam (Fri Nov 17)	10%
Laboratory	25%
Final exam (Mon Dec 18, 3:30PM)	35%

PHYS 121 Spring 2024 Course Schedule:

Here is an *approximate* schedule for the course (subject to modification in the weekly reading and homework assignment). For this table, I count 14 + 1 weeks in the class and label each week by the date of the Monday on that week. Note that all Hour Exams will be held on Fridays. **Important: the dates indicated for the Hour Exams and the Final Exam are fixed**. Also dates where no class will be held are so indicated:

	Wk	Monday Date	Assigned Reading from Online Notes:	Important Dates
Cycle 1	1	Jan 15	Ch 00 to Ch 04	
	2	Jan 22		
	3	Jan 29	Ch 05 to Ch 08	**First Homework Due Mon Jan 29**
	4	Feb 05	Ch 09 to Ch 12	
	5	Feb 12	Ch 13 to Ch 15	**1st Exam: Fri Feb 16**
Cycle 2	6	Feb 19	Ch 01+ to Ch 04+	
	7	Feb 26	Ch 05+ to Ch 08+:	
	8	Mar 04	Ch 08+ to Ch 12+	
	-	Mar 11	-	**No classes, No Labs: Mar 11 thru Mar 15**
	9	Mar 18	Ch 13+ to Ch 15+	**2nd Exam: Fri Mar 22**
Cycle 3	10	Mar 25	Ch 01++ to Ch 04++	
	11	Apr 01	Ch 05++ to Ch 07++	**No Class Mon Apr 08**
	12	Apr 08	Ch 08++ to Ch 11++	
	13	Apr 15	Ch 12++ to Ch 15++	**3rd Exam: Fri Apr 19**
Cycle 4	13	Apr 15	Gravity & Relativity	
	14	Apr 29	Astrophysics & Cosmology	**Mon Apr 29: Last Day of Class**
			Reading Days: Apr 30, May 01	No classes.
		Dec 18	**Final Exam**	**3:30 to 6:30 PM, Tue May 07**

PHYS 121: Anticipated Typical Weekly Workload:

At CWRU the "rule of thumb" is that a four credit hour course should correspond to a total average weekly time commitment of about 12 to 16 hours per week. Here's how this breaks down for Physics 121:

Hours per Week	Weekly PHYS 121 Activities:
3	In-class lecture hours
2	Readings, video clips, supplementary materials
4	Written Homework
3	Labs: (*either* in-lab *or* prep and lab reports)
(4)	Optional: additional practice, study, office hours, SI sessions)
12 to 16	**Total Average Hours per week workload**

PHYS 121: Goals and Philosophy of the Course:

The main goals for for Physics 121 General Physics I: Mechanics are:

- To have students **understand** the formal method of investigating the world through the physical sciences, and in particular, to have students learn for themselves how physics as a discipline can be used to obtain a deep understanding of how the world really works and how that knowledge can be used to make predictions and solve problems.

- To have students **understand** the calculus-based mathematical formalism for describing the motion of bodies (called kinematics) and also to **understand** the major scientific paradigm called **Newton Laws** which explains the causes of motion (called dynamics) in terms of forces.

- To have students **understand** the major reformulation of Newton's Laws, known as the **Conservation Laws** (energy and momentum) which can provide powerful ways for explaining essential physical phenomena.

- To have the students **understand** a select set of modern physics topics as a window into 'thinking like a physicist" which provides a powerful general approach for tackling a wide range of technical problems in almost any field of endeavor.

- To have students **demonstrate** their mastery of all of the above listed understandings by successfully **applying** physics concepts toward **solving a broad range of problems** – including conceptual and technical problems, both familiar and unfamiliar – with clarity, precision, logical coherence, and mathematical sophistication.

- To have student **explain** their own problem-solving work correctly, clearly, and completely, further demonstrating the breadth and depth of their understanding.