Class Meeting: **MWF** 10:10-11:30am
Class Location: Heg 102; Lab: Heg 107
Office Hours: **F** 3-5pm

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Course Description — We will explore the Physics of motion. This is a surprisingly rich pursuit; in particular, the art of doing physics turns out to be choosing what to ignore. The physical world around us is overflowing with detail and complexity and to study one facet we often must ignore another. In this course we will discover the unreasonable effectiveness of Newton's approach to this art and the resulting insights into *predicting* how things move and why. In particular, we will develop a full quantitative description of motion and its relationship to *momentum*, *force*, and *energy*. You will become fluent at alternating between conceptual and quantitative forms of explanation, and polish your incisive, scientific thinking.

Text: *Fundamentals of Physics*, by D. Halliday, R. Resnick, and J. Walker (10th Ed, Aug 2013)

Week	Topics	Lab	Chap.
9/2	Motion in 1D: Position, velocity, acceleration. Check out: The Hidden Value of Ignorance &	**No Lab** Radiolab: $\leq$ kg	1 & 2
9/9	Constant acceleration. Projectile motion.	Measuring Time	2
9/16	Vectors, vector products. 2-D and 3-D motion.	Vector Addition	3 & 4
9/23	Momentum & Mass	Ballistic Motion	9
9/30	Forces & Newton's laws of motion.	**Exam 1**	5
10/7	Tension, Springs, Friction. Work.	Prob. S.: Springs	6
10/14	**Fall Break 10/14-10/15** Energy & Work.	**No Lab**	7
10/21	Potential Energy & Power	Conservation Laws	8
10/28	Rotational Motion	Collisions: Design	10
11/4	Torque & Angular momentum.	Collisions: Execute	11
11/11	Gravitation & Planetary Motion	**Exam2**	13
11/18	Simple Harmonic Motion & oscillations.	Rotation	15
11/25	Special Relativity. **Thanksgiving 11/28-12/1**	Problem Solving	37
12/2	Waves	Harmonic Motion	16
12/9	Sound & Interference. **Advising Day 12/11**	Waves on String	17
12/16	**Completion days. 12/20 Last day classes**	**Exam 3** **12/16-17**	

Note: I reserve the right to adjust this syllabus during the semester
Course website: faculty.bard.edu/hhaggard/teaching/phys141Fa19/

Exam 1 (09/29 & 09/30) : Motion problems in 1-D, 2-D, 3-D. Momentum.
Exam 2 (11/10 & 11/11) : Momentum, Forces, and Energy.
Exam 3 (12/15 & 12/16) : Comprehensive. Rotation. Oscillations & Waves.

Homework — There will be homework due every Wednesday at 6pm and homework corrections due every Friday by 6pm. The goal of the homework is for us to engage each other in a discussion of physics regularly, please come and visit as often as you like to chat. Along these lines, I recommend that you work together; this is invaluable in learning physics. Please write things up yourself to show me *and you* that you understand it (this helps battle the illusion of explanatory depth, or knowledge illusion). Someone will be doing help sessions for the course, and will give you clues on solving the problems. I will always answer any questions in class, as well. Please do not use the internet as a resource for anything but definitions of terms.

Grading Structure

Weekly Homework (due Weds by 6pm)	25%
Lab Reports (due Thurs by 5pm)	20%
Quizzes	10%
Exam 1	15%
Exam 2	15%
Exam 3	15%

Each week half your homework grade will be based on uncorrected and half on corrected problems. The homework correction pro forma is described on the homework tab of our course website.

Bard Physics Intro Courses Lab Policy — We will have lab most Mondays/Tuesdays, see table above for dates. Attendance is **required** at all lab sessions. If you miss a lab meeting, your course grade will be lowered by one level (e.g. from B+ to B) for each lab that you miss. Chronic lateness may also lower your grade. We will discard your lowest lab score, and average the remaining lab scores to come up with a grade for the lab.

If you have a problem that will keep you from being in lab, you need to discuss this with your instructor in advance. We will see what we can do to help out; we may ask you to attend a different lab section. Generally, it is not possible to make up a lab that you missed. Your lab reports will be due on Thursdays by 5pm.

Exams — During the exam times (basically, all of the lab periods that week) you will pick up the exam from a course professor, sit in the lab or nearby, and return it two hours later. You can bring your calculator and one sheet of paper with whatever notes or formulas you want on it, but otherwise these are closed book, closed note exams. You must not collaborate or consult with anyone else while taking the exam. I will give more specifics as we review the material before each exam.

Accessibility — If you anticipate issues related to the format or requirements of this course, please meet with me. I would like to support everyone's full participation in the course. Students who have already been approved to receive academic accommodations through disability services should share their accommodation letter and make arrangements for us to meet as soon as possible. If you need to register a learning difference or disability, you can contact Disability Support Services at disabilityservices@bard.edu. The Coordinator will confidentially discuss the process to establish reasonable accommodations. Please note that accommodations are not retroactive and require advance notice to implement.