PHYS 121 H: Introductory Physics I | Fall 2020

Instructor: Dr. Eileen Meyer | email: meyer@umbc.edu

Class Times: M/W/F 9-9:50 AM Blackboard Collaborate
Discussion: Wednesdays 10-11:50 AM Blackboard Collaborate
To access the online course go to: blackboard.umbc.edu and click on PHYS 121H – Fall 2020
You will find the link to the blackboard collaborate session room in the link menu.

Welcome to the world of Physics! Whether you plan on a career in physics, engineering, medicine, or some other field, you will quickly learn that physics is at the foundation of much of it. In particular, in this course we will learn the basics of *mechanics*, i.e., how objects move when subject to forces, and the connection of this motion to energy and momentum. The goal of this course is not only to teach you the basics of mechanics with calculus, but also to **think like a physicist**. Many of you will find this challenging at first, especially if you have been taught in an environment with a lot of testing which tends to emphasize memorization and learning 'by rote' rather than true understanding and physical insight. Be not afraid – we will help you to learn these other skills as well. Because our goal is to teach you to think like a physicist, this is largely an active learning course. **This means that you will be responsible for your first exposure to the material, through both reading and pre-lecture videos.** The in-class time will be spent challenging you and asking questions to cement your understanding of the concepts. There will be many opportunities in class, during the discussion session, and online to ask questions and improve your understanding. If you have not experienced 'active learning' before, you might be worried, but don't be. We've worked hard to make sure that the expectations for the course are as clear as possible so as long as you follow directions outlined in this syllabus and show up to class with a spirit of curiosity and openness to learning, you will do great.

Elements of this Course:

Reading Before Lecture.

Below you will find a course schedule which lists the topic of each lecture, as well as the dates of quizzes, and when pre-lectures (described below) and homework is due. For each lecture, to the right you will find a corresponding reading assignment. One of the major transitions you will make in college is towards a much higher reliance on reading and self-teaching from reading. Why is this important? As you get to higher and higher levels in your chosen field (whether physics or something else), you will inevitably get to the point where *there is no class for what you want to learn.* There are only books and published papers. At this point, your years of training yourself to read and understand concepts from a textbook or similar source will really be important. The Course Materials Initiative (CMI) which is offered for this course, provides you with electronic access to the textbook we use (see below). However, if you prefer to read a paper copy, you are by all means encouraged to obtain one (be sure to get the right edition (6th), but used is fine and usually much cheaper).

Pre-Lecture.

Each week, there will be one or two "pre-lecture" videos provided under the FlipItPhysics program (see "Accessing Course Materials" below or on the Blackboard site). These videos are required watching & will provide an introduction to the material that will be covered that day. *I highly recommend that you first read the associated material in the textbook* (which will necessarily be more comprehensive & informative than a video), and *then* watch the pre-lecture as a kind of "summing it all up" experience,

though you are encouraged to do what works for you. Further below in this syllabus you will find a detailed schedule for the semester that lists both the reading sections for each lecture and the dates that pre-lectures are due.

During the pre-lecture, there are "checkpoint" questions that will check your understanding of the material at a basic level (this is also why it is best that you read first, watch video second). In the FlipItPhysics system, you will login to watch the video and complete the checkpoint. Both must be completed by 8 AM on the day assigned in order to get credit (note: for obvious reasons, it is generally preferable to do these the day before or earlier unless you enjoy getting up very very early).

The combined pre-lecture and checkpoints are worth 5% of your final grade.

Quizzes.

Each week that there is not an exam, there will be a "quiz" due on the Friday. These are really more like weekly mini take-home exams. The problems for the quiz are released on blackboard on Monday night, and you have until Friday at 9 AM to complete your solutions. You are allowed to use your book, notes, lectures, and flip-it videos for reference, as well as other physics books you may have on hand. However, you are ***strictly forbidden*** from consulting with other students on these problems or using the internet in any other way (i.e., you may not google the solution). Your solutions, which must be entirely your own work, must be uploaded to blackboard as a single PDF file (multiple files or images will be given a zero automatically by the system) before the due date. In the normal "in-person" class, you would be given 15 minutes at the beginning of class on the Friday to reproduce one of the problems on a blank piece of paper (you would not know in advance which one). For the online course, one of the problems will be graded "closely" according to the rubric available on blackboard, on a 10/10 scale. The other two are graded for "honest effort" completion – a full and honest but ultimately incorrect solution will be given 1 point (out of 2) while a full and complete solution will get 2 points out of 2. Missing, sloppy, or simply inadequate (not an "honest effort") solutions will get zero points. The total quiz is thus worth 14 points (as there are always three problems). Quiz solutions must follow the "Beautiful Solution" rubric which is explained in a separate document posted on blackboard.

The quizzes are worth 7.5% of your final grade.

Lecture.

For the fall 2020 semester, the course will be entirely online. You will join the online class using blackboard collaborate every class period (MWF at 9 AM) – attendance is required. The lecture will be a bit different than you may have experienced before. It is most definitely NOT the place where I, the professor, tell you physics concepts for the first time. That MUST occur before you arrive in the lecture space, through the assigned reading and pre-lecture. The class period is much better spent *attacking misconceptions* and accordingly it will consist of group problem solving and `clicker questions' (many of these conceptual) that challenge your understanding. It is vital that you come prepared to lecture; further, you should anticipate being called on by the professor to explain your answer to a problem you have been assigned to work live in class. This will be part of your participation grade.

Clickers in class: In the previous "in-person" course, we used devices called 'clickers' which allowed me to instantly poll the class with multiple-choice questions. There are great for getting instant feedback on what you do and don't understand. (They are also used to track attendance and attention). In the online course, we will use the same software – TurningPoint, but rather than physical devices you will "click in" your answer either through a web browser or (more easily) using your smartphone,

if you have one. It is your responsibility to make sure the clicker software is working properly by the third class. Participation credit for lecture (through clicker responses) is worth 5% of your final grade. It is ok to get wrong answers on the clicker questions – while you should try your best to get it right, you are graded only on whether you answer or not.

Recordings: All classes are recorded (as screencasts) and will be uploaded to a Box folder (link will be on blackboard) as both a PDF and a movie shortly after the class ends.

Discussion.

Discussions are weekly meetings where you work on a packet of problems in small groups and under the observation of the discussion instructor. For this course, discussion will be held on Wednesdays from 10-11:50 online using Blackboard Collaborate. Discussion is designed to provide you with a collaborative learning environment so you can help and learn from each other. Some of the assigned problems will be quite challenging. We find that this is the best environment to tackle these problems, which can have solutions which are at first counter-intuitive, because of the group environment. However, each student is ultimately responsible for writing out and fully understanding the solution to all problems in the packet. "Direct copying", besides sabotaging your learning, will also be penalized if observed by the instructor.

The discussion grade is a "completion" grade – before you can "leave" the virtual discussion, the instructor will check your answers and be sure that you understand all the solutions with a few pointed questions. If any answers are incorrect, you will be sent back to figure it out (perhaps with a hint). In the rare case where, despite working diligently through the entire discussion, a student is unable to finish all the problems, it will still be possible to get a full completion grade at the discretion of the instructor.

Attendance at discussion is mandatory and full attendance is required. A penalty of 50% of the grade will be imposed if you log in more than 10 minutes late. The discussion grade is 10% of your total final grade.

Homework.

A major part of the learning process and your success will come about as a result of doing homework. If you do not put forth a serious effort into your homework, you will likely NOT do well in this class. Individual homework will be submitted via the FlipItPhysics online system. For each pre-lecture unit, there is one associated homework unit. As a general rule, assignments will be due on Sundays and Thursdays at 11:59 PM, *though sometimes they will be due other times (usually this happens just after an exam) – check the schedule!*

You are normally allowed six submissions per question. Homework questions can in general be difficult and you will probably find that you will spend a significant amount of time on them. Don't put off assignments until the night before they are due. Instead, start your homework as soon as you do the reading and pre-lecture so you have the time to properly digest the concepts and get assistance from the TA office hours, the regular office hours, or other students. Sometimes you will need to "sit" on a question you at first fail to answer and return to it after thinking about it for a while. Like in the discussion, you are encouraged to work together, however, it is your responsible to fully understand the material.

Homework is worth 7.5% of your final grade, however you should **not** make the mistake of thinking it is not very important. It is the primary way that you will prove your mastery of the concepts to yourself and prepare for exams (which are 65% of your final grade). Take homework seriously.

Exams.

There are three mid-term exams corresponding to three "Units" of material which is usually 3-4 chapters of the textbook and about 6 pre-lecture units. The exams for Fall 2020 will be two-part. Part A will be a timed, closed-book, live exam on blackboard during the normal class time. Part B will be take-home, open book, and due the following Monday at 9 AM. (All exams are on Fridays this semester). Further details of the exams will be released on blackboard a week or two before they are to take place.

A note on time spent on this course: *new students may not be aware of the "3x" rule for estimating how much time a college course will require outside of lecture (and discussion). In general, the number of hours is at least 3 times the credit hours. That means that you should be spending about 9 hours per week reading, doing pre-lectures, homework, and studying for quizzes and exams. Exceeding this number slightly is normal and often typical for physics courses. Please spend some time planning where in the week you will put the time for this course. If you need help sticking to a plan, consider getting a "reading buddy" to read the text or watch pre-lecture at the same time as you (similar to how "workout buddies" can greatly improve your attendance at the gym!). If you feel that you are struggling with the load in this course, please feel free to come speak to me about it office hours. It's important that problems are addressed early and feedback is always welcome.*

Accessing Course Materials & Resources

Blackboard.

This course will use a custom site at blackboard.umbc.edu to transmit course materials (such as lecture slides, solutions, ideos, etc) and organize announcements (which will also arrive in your inbox). It is the main site for all course information. Your grade will also be visible and updated regularly here. The Blackboard site will include a discussion board where you can post questions – please use it!

Textbook.

This course is participating in the "Course Materials Initiative" (CMI). Through this program, all students receive immediate access to an electronic version of the required textbook (e-textbook), **Physics for Scientists and Engineers 6th edition by Tipler**, *via the VitalSource Bookshelf link in Blackboard.* The charge for electronic access to the book is billed through your tuition and fees statement at UMBC. **A code will be emailed to you before the semester starts**. Please contact the bookstore if you do not have access to the book at least a week before classes begin! You will have access to the e-book for three full years (from the beginning of the semester). Make sure to download the VitalSource App for offline use.

Opting Out of CMI - Your participation in the CMI is completely optional. You may opt out of the program and receive a full refund by completing the CMI Consent for Removal Form (search on my.umbc.edu) and submitting it in person to the Bookstore Textbook Managers desk by September 10th.

Please visit the CMI webpage, bookstore.umbc.edu/cmi, for more information!

FlipItPhysics.

As well as having automatic access to an electronic version of the required textbook, CMI also gives you access to the FlipIt Physics website (ww.flipitphysics.com) using your individual code which is emailed to you. **Please make sure to access this prior to the add/drop date September 10th (you will need to, in any case, for the first pre-lecture due on August 28th).** If you have opted out of CMI, you can still join the course under a temporary account (in case you drop the course), and you will have several weeks to purchase access through the site itself.

The code to join this course (PHYS 121H Fall 2020) is: 143ab0bf

Your Grade:

Pre-lecture and checkpoint on FlipItPhysics: 5%
Quizzes: 7.5%
Lecture Participation: 5%
Homework: 7.5%
Discussion: 10%
Exams (each, there are 3): 15%
Final Exam: 20%

You can find your current grade on the course Blackboard site. It will generally be up-to-date to within the last week.

Make-up and Late Policies:

Lecture: You will be given three "free" days for not clicking in during lecture. These count towards ALL absences and clicker malfunctions. No explanation is required.

Online FlipIt Physics pre-lecture, checkpoints and homework: A one-time extension of one week is available for one assignment. Otherwise make-up work is generally not allowed except in extreme circumstances*.

Discussion: There is no make-up discussion. If you must miss a discussion for legitimate reasons*, contact the instructor as soon as possible to make an alternative arrangement.

Quizzes: There are no make-up quizzes, however if you miss a quiz for legitimate reasons*, you must contact me as soon as possible.

Mid-term exams: Make-ups will only be allowed for legitimate reasons*, and it is your responsibility to contact me regarding arrangements for a possible make-up.

Final exam: There is NO make up for the final exam. An alternate time for the final exam will be allowed in cases where the final exam of another class conflicts with our final exam (you will be required to provide documentation showing this). It is your responsibility to find out when your final

exams will occur and e-mail me well in advance of the week of finals if you discover a conflict with another class.

Asynchronous Learning: In very rare circumstances, it may be the case that a student does not have the ability to attend lecture "live" or synchronously for the entire term (this is not for occasional problems of access, see above lecture policy for this case). If you believe this is the case for you, please contact me before the start of the semester to see what accommodations can be arranged.

**Legitimate reasons are defined as officially-sanctioned UMBC activities, illness, family emergency, detention by authorities, or another insurmountable difficulty. Please contact me as soon as you are able to do so if something of this nature arises.*

Course Resources and Additional Help:

Instructor Office Hours: Mon & Wed 1:45 - 3:00 on Blackboard Collaborate

TA Office Hours: TBD

Physics Tutors: The LRC has physics tutors with walk-in hours as well as more in-depth small group sessions. The times and locations will be posted on Blackboard as soon as we know the details for the online Fall 2020 semester.

Discussion Board: A discussion board is available on Blackboard for both general questions about the course (such as questions regarding course policies) as well as physics related questions.

Academic Integrity

All instances of academic misconduct will be addressed according to the UMBC Policy on Academic Integrity. Examples include attempting to make use of disallowed materials on quizzes and exams, attempting to communicate with anyone other than the instructor or TA during an exam, altering graded work and submitting it for regrading, asking someone else to take an exam in your place, copying another's work on homework, asking someone else to do homework and representing it as your own, and permitting or assisting another student to carry out any of the above. Penalties range from a grade of 0 on a homework or exam to an F in the course (at my discretion), and from denotation of academic misconduct on the transcript to expulsion (as determined by official hearing of the Academic Conduct Committee).

Student Disability Services

If you have any condition such as a physical learning disability, which will make it difficult for you to carry out the work as I have outlined it or which will require academic accommodations, please notify me in the first two weeks of the course. For those students that are allowed extra time on exams based on their accommodations, it is your responsibility to arrange to take exams with SDS and you must contact SDS at least 48 hours before every exam to make appropriate arrangements.

Course Schedule

Week	Date	Pre-Lecture	Quiz	HW	Lecture Topic	Textbook	Discussion
		Due 8:00 AM	*9 AM*	*12 AM**			*Wed 10-11:50 AM*
1	Aug 28 (F)	*Unit 1*			Course Introduction; Vectors, Displacement, & Distance	Ch1: 1-7	
2	Aug 31 (M)	*Unit 2*			Speed, Velocity & Acceleration	Ch2: 1-2	Vectors, 1-D Kinematics
	Sep 2 (W)				1-D Kinematics, Free Fall	Ch2: 3	
	Sep 4 (F)	*Unit 3*	1	Units 1,2	Projectile Motion, 2-D Kinematics	Ch3: 1-2	
3	**Sep 7 (M)**				**Labor Day (NO CLASS)**		2-D Kinematics, circular mot.
	Sep 9 (W)	*Unit 4*		Unit 3	Relative Motion & Circular Motion	Ch3: 3	
	Sep 11 (F)		2		Forces, Mass, & Newton's 1 and 2 Laws	Ch4: 1-5	
4	Sep 14 (M)	*Unit 5*		Unit 4	Free-body Diagrams & Newton's 3 Law	Ch4: 6-8	Friction, Newton's Laws
	Sep 16 (W)	*Unit 6*			Friction, Drag Forces	Ch5: 1-2	
	Sep 18 (F)		3	Unit 5	Motion along a Curved Path	Ch5: 3	
5	Sep 21 (M)	*Unit 7*		Unit 6	Scalar (Dot) Product, Work & Kinetic Energy	Ch 6: 1-3	Unit 1 Review
	Sep 23 (W)				Unit 1 Review	Ch 1-5	
	Sep 25 (F)				**Exam 1 (Chapters 1-5, pre-lec 1-6)**		
6	Sep 28 (M)	*Unit 8*			Work-Kinetic Energy Theorem	Ch6: 4	Work & Kinetic Energy
	Sep 30 (W)	*Unit 9*		Unit 7	Potential Energy and Conservative Forces	Ch7: 1-3	
	Oct 2 (F)		4	Unit 8	Newton's Law of Gravity & Gravitational Potential Energy	Ch11: 2-3	
7	Oct 5 (M)	*Unit 10*		Unit 9	Center of Mass	Ch5: 5	Conservation of Energy
	Oct 7 (W)	*Unit 11*			Conservation of Momentum	Ch8: 1-2	
	Oct 9 (F)		5	Unit 10	Conservations Laws: Problem Solving		
8	Oct 12 (M)	*Unit 12*		Unit 11	Collisions & Impulse	Ch 8: 3-4	Cons. Of momentum, collisions
	Oct 14 (W)	*Unit 13*			Elastic Collisions		
	Oct 16 (F)		6	Unit 12	Applications: Collisions		
9	Oct 19 (M)	*Unit 14*		Unit 13	Rotational Kinematics	Ch9: 1-2	Unit 2 Review
	Oct 21 (W)				Unit 2 Review	Ch 6-8,11	
	Oct 23 (F)				**Exam 2 (Chapters 6-8,11)**		
10	Oct 26 (M)	*Unit 15*			Moment of Inertia	Ch9: 1-2	Rotational Kinematics
	Oct 28 (W)	*Unit 16*		Unit 14	Parallel Axis Theorem, Torque	Ch9: 3	
	Oct 30 (F)		7	Unit 15	Rotational Dynamics	Ch9: 4-5	
11	Nov 2 (M)	*Unit 17*		Unit 16	Rolling With and Without Slipping	Ch9: 6	Rotational Dynamics
	Nov 4 (W)	*Unit 18*			Rotational Dynamics: Problem Solving	Ch12: 1-3	
	Nov 6 (F)		8	Unit 17	Static Equilibrium	Ch12: 1-3	
12	Nov 9 (M)	*Unit 19*		Unit 18	Static Equilibrium: Problem Solving	Ch12: 1-3	Static Eq. & Ang. Momentum
	Nov 11 (W)	*Unit 20*			Angular Momentum	Ch10: 1-2	
	Nov 13 (F)		9	Unit 19	Conservation of Angular Momentum	Ch10: 3	
13	Nov 16 (M)	*Unit 21*		Unit 20	Simple Harmonic Oscillation	Ch14: 1-2	Unit 3 Review
	Nov 18 (W)				Unit 3 Review		
	Nov 20 (F)				**Exam 3 (Chapters 9,10,12)**		
14	Nov 23 (M)	*Unit 22*			Physical Pendulum	Ch14: 3	Simple Harmonic Oscillations
	Nov 25 (W)			Unit 21	SHO applications	Ch 14	
	Nov 27 (F)		10	Unit 22	Special Relativity	Chapter R	
15	Nov 30 (M)	*Unit 23*			Density & Pressure	Ch13:1-2	Fluids & Special Relativity
	Dec 2 (W)				Buoyancy and Archimedes Principle	Ch13:3	
	Dec 4 (F)		11	Unit 23	Final Exam Review		
	Dec 7 (M)				Final Exam Review		
	Dec 11 (F)	8-10 AM Final Exam					

*Homework is due at 11:59 the day before noted. Other "due times" listed here are for the day of the note.