

# PHYS 121: Introductory Physics I

Instructor: Dr. Goolsby-Cole | Spring 2018

Section 1 — 9:00-9:50 AM — Meyerhoff 30 (Lecture Hall 2)

Section 10 — 11:00-11:50 AM — Physics 101 (Lecture Hall 6)

Welcome to Introductory Physics I! This course is the first semester of the calculus-based introductory physics courses. Our course will focus primarily on classical mechanics with topics including particle kinematics and dynamics, Newton's laws of motion and gravitation, rotational motion and dynamics, collisions, momentum, energy and conservation laws. The Table of Contents below will help direct you to any section in the syllabus that you might be interested in, however it is your responsibility to read over the syllabus in its entirety. Please let me know if you have any questions or concerns and I look forward to working with you this semester!

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## Instructor Contact Info & Office Hours

- Dr. Goolsby-Cole | E-mail: [cagc@umbc.edu](mailto:cagc@umbc.edu) | Office: Physics 323
- My office hours will be: Monday 1:30-2:30 PM, Thursday 10:00-11:00 PM, Friday 1:00-2:00 PM, or by appointment. You are also free to stop by my office anytime. If I am there, then I will usually (but not always) be able to answer questions.

## Course Prerequisites

- In order to be enrolled in this course, you must have completed MATH 151 or MATH 151H with a "C" or better OR be concurrently enrolled in MATH 151 or MATH 151H.
- Basic college algebra and trigonometry will be used extensively in this course. Calculus will be used primarily to motivate certain concepts such as how acceleration is the time derivative of velocity.

## E-mail Policy

- E-mail is not a good way of addressing physics related questions and I will usually not address such questions by e-mail. Physics questions are best answered in person either at my office hours, with your fellow classmates, during the discussion sections, with TAs during their office hours, at a SI/PASS session, or with a physics tutor. Another option is to post questions on the Blackboard Discussion Board where your classmates and I can respond.
- Email is — however — a great method for non-physics questions such as grades or the course schedule. Please include your full name, course number, and use your UMBC email address to ensure a prompt response.

## Required Textbook & Other Material

- This course participates in the **Course Materials Initiative (CMI)** which is a program developed to provide students with reduced pricing for course materials through digital textbooks and ancillaries. This means that our textbook (Tipler) and online resources (FlipIt Physics) are included when you register for this course and do not have to be purchased separately.
- **Physics for Scientists and Engineers, by Tipler and Mosca, 6<sup>th</sup> ed., Volume 1**: An electronic version of this textbook is available online when you enroll in this course — see the Blackboard site for details. For questions about how to obtain and access the online textbook contact the bookstore: [textbook@umbc.edu](mailto:textbook@umbc.edu) or 410-455-2695.
- You will use an online resource called **FlipIt Physics** to receive pre-lecture videos and complete homework assignments. Instructions on how to access FlipItPhysics are available on the Blackboard site. For questions about initial sign-on and accessibility contact FlipIt Physics: 1-800-936-6899 or [FlipIt Physics Help](#).
- **Clickers (Turning Technologies RFC-03)** will be used in class to record attendance and assess your understanding of the material through in-class questions. Clickers can be purchased from the UMBC bookstore. For questions/problems related to Clickers submit an RT ticket here [RT Ticket](#) under the Computer & Technology Tab or go to the UMBC Bookstore.
- You may use a **scientific calculator** on homework, discussions, and exams. No cell phones or any other mobile device will be permitted during exams or discussions.
- Finally, a clear and focused mind, positive attitude, and a good dose of patience!

## Course Learning Objectives

This course addresses the General Education Program (GEP)'s functional competency Scientific and Quantitative Reasoning. It has been approved to meet the GEP Sciences distribution requirement. In particular, it addresses the following two competencies:

- Understand and use mathematical and scientific methods of inquiry, reasoning, processes, and strategies to investigate and solve problems.
- Organize, interpret, draw inferences, and make predictions about natural or behavioral phenomena using mathematical and scientific models and theories.

In addition to the above general competencies, below are specific learning objectives that students should be able to demonstrate by the end of the semester:

- Solve 1-dimension and 2-dimension kinematics motion problems
- Apply Newton's laws to solve problems related to motion and force
- Apply principles of energy to solve mechanics problems
- Apply conservation of momentum to solve problems related to collisions
- Apply Newton's 2<sup>nd</sup> law for rotation to solve rotational dynamics problems
- Solve problems related to static equilibrium
- Apply conservation of angular momentum to solve problems
- Apply Newton's laws and principles of energy to solve problems related to simple harmonic motion

There will be an even more detailed list of learning objectives that you should be able to perform for each exam posted on our Blackboard site.

## Strategies for Success

- Be sure you have the time required for this course. You are expected to attend all classes – lectures and discussions. In addition, experience shows that success requires at least 8 hours of intensive effort outside of class each week. If you typically spend much less than 8 hours studying outside of class, you are unlikely to be able to learn the material. If you typically spend much more than 12 hours of outside study, you should consult with me about ways to study more efficiently.
- Physics is primarily about understanding, not memorization. Even though getting the final answer is important, it is much more important to understand the process of how you arrived at your answer so that you can use the same process to solve future problems (such as on the exams).
- The act of learning the material is ultimately up to you, no one else can “learn” the material for you. That being said, there are many recourses that can help you with the course material including but not limited to the textbook, your fellow classmates, TAs and LAs, myself, FlipIt Physics, SI/PASS help sessions, YouTube, physics tutors, and much more. Use each of these recourses wisely.
- An essential component in learning the material (and life in general) is to develop the ability to think and learn for yourself. You cannot passively watch me or your classmates and expect to understand the concepts and develop problem solving skills. In the context of this course that means being actively engaged to learn the course material.

## Grading Policy

Type of Assignment	Percentage
FlipIt Physics: Pre-lecture and Checkpoint	5%
Lecture Participation (Clicker)	5%
Weekly Quiz	5%
Homework	10%
Discussion	10%
Exams (3 @ 15% each)	45%
Final Exam	20%
Total	100%

Percent Range	Letter Grade
90.0% or Above	A
80.0% - 89.9%	B
70.0% - 79.9%	C
60.0% - 69.9%	D
59.9% or Below	F

- There will be **NO** extra credit at the end of the semester. If you are struggling in the class, it is far easier to fix problems early in the semester than waiting until the end of the semester.
- Check your grades on Blackboard routinely. Please contact me or your TA for any grading questions within **TWO** days after your grade is available.

### Pre-Lecture

- It is important to read the related textbook sections and complete pre-lecture assignments via FlipIt Physics **PRIOR** to every lecture. Your in-class comprehension of the material will be much more efficient if you have already been exposed to it. The class time will mostly be spent on clarifying and applying this material.
- As a general rule, the FlipIt Physics pre-lectures and checkpoints will be due on Mondays and Wednesdays at 8:30 AM, though the due dates may be adjusted on occasion.

### Lecture

- Clickers will be used to track attendance and promote active learning by providing instant feedback for both myself and for you. It is your responsibility to both bring your clicker to every class and to make sure it is working properly. If your clicker does not work or if you forget your clicker, you will not receive attendance credit for that day. Be sure to have extra batteries for it as well.
- The lecture slides will usually be posted on Blackboard before every lecture. These will provide you with the structure of every lecture and help to facilitate the note-taking process. It is important to remember that these slides are not the complete content of the class but only an outline and so studying them *only* is not a substitute for attending lectures.
- If you miss any lectures, you are still responsible for the material covered.

### Discussion

- Discussions are weekly meetings where you work on a packet of problems in small groups — it's designed to provide you with a collaborative learning environment so you can help and learn from each other.
- Each discussion grade will be divided equally between your attendance and submitted work. The submitted work will be graded based on selected problems from a particular packet.
- Attendance at the discussion class in which you are registered is mandatory and full attendance is required. A penalty may be imposed if you arrive late as well as removal from your group for that day's discussion.
- You are allowed to bring your calculator and any notes you have taken from lecture, the textbook, or FlipIt Physics, but you are not allowed to use any other electronics such as laptops or cellphones.

## 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. As a general rule, assignments will be due on Thursdays at 11:59 PM, though the due dates may be adjusted on occasion. 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. This – however – is to be expected. A key strategy for learning the material is to start as soon as possible. Many concepts we will discuss will not be easily digestible the first time around. Don't put off assignments until the night before they are due. Instead, start your homework early so you have the time to properly digest the concepts which will enable you to do well on the homework which in turn will help on the exams.
- You are encouraged to work together, however, it is your responsible to fully understand the material. Even though homework constitutes 10% of your overall grade, exams – for which you are solely responsible - make up the majority at 65%.
- There are websites where you can view (or perhaps purchase) solutions to homework problems. I – of course – cannot stop you from cheating. However, you will be doing yourself a *massive* disservice if you leap to the solutions manual in your first attempt if your solution fails. You may go down a wrong path in solving a problem, but sometimes you need to do this to find the correct way to solve a problem.

## Quizzes

- Weekly quizzes are given on Fridays at the end of class covering material from the previous two or three classes as well as material from that week's homework assignments.
- You are not allowed to use any resources for the quiz (such as notes, cellphones, or laptops) except for your calculator and your neighbor (you can work on the quiz with those around you).
- Quizzes are meant to help prepare you for the exams by having you solve problems that would be similar to those you might see on exams. Additionally, you will only have a finite amount of time (~15 minutes) to complete quizzes which again helps to prepare you for the finite amount of time for exams (50 minutes).

## Exams

- If you want to do well in this course, then you will need to do well on all the exams. The pre-lectures, lectures, discussions, quizzes and homework are meant to help you acquire the understanding and problem-solving skills you'll need to do well on the exams.
- Three 50 minute exams will be given on Friday mornings from 8:00-8:50 AM. See the schedule for the exact dates and see the seating chart posted on Blackboard for your specific room and seat.
- Each exam will consist of a mix of multiple-choice questions and show-your-work problems.
- You are allowed to bring a 3 inch  $\times$  5 inch index card and use a scientific calculator during exams. No cell phones or other communication devices will be allowed.

## Final Exam

- The final exam will be comprehensive, with some extra weight to the content that follows the last mid-term exam.
- The exact date and time for the final exam will be announced later in the course, however you should plan on being on campus until May 23<sup>rd</sup> (the last day of exams). If you currently have plans or make plans to leave prior to May 23<sup>rd</sup> and our final exam date/time conflicts with these plans, you will most likely **not** be allowed to take the exam at another time.

## Make Up Policy

Life is full of surprises so it's understandable that you might miss a class or two. The course policy has been set up to accommodate a few unexpected situations.

- **Lecture:** You will be given three “free” days for not clicking in lecture. These count towards ALL absences and clicker malfunctions.
- **Online FlipIt Physics pre-lecture, checkpoints and homework:** You can request an automatic extension any time up to 3 days after the assignment is due with a 50% penalty of all unearned points.
- **Discussion:** There is no make-up discussion. The lowest discussion score will be dropped at the end of the semester. If you must miss a discussion for legitimate reasons\*, contact your TA 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 might be allowed in cases where another class's final exam 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.

\*Legitimate reasons are defined as officially-sanctioned UMBC activities, illness, family emergency, detention by authorities, or another insurmountable difficulty. I'll request written verification for the cause of your absence.

## Course Resources and Additional Help

- **Instructor Office Hours:** Monday 1:30-2:30 PM, Thursday 10:00-11:00 PM, Friday 1:00-2:00 PM, or by appointment.
- **TA Office Hours:** TAs will hold weekly office hours usually in PHYS 226. The times and locations will be posted on Blackboard.
- **SI/PASS Sessions:** The Learning Resource Center (located in Sherman Hall Room 345; <http://www.umbc.edu/lrc/>) holds SI (supplemental instruction) through PASS (peer assisted study sessions) for this and many other 100- and 200-level courses. The times and locations for these sessions will be posted on our Blackboard site.
- **Physics Tutors:** The LRC also 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.
- **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 (SDS)

- 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. Since SDS opens at 8:30 on Fridays, you will need to schedule to take your exams at 8:30 on those Fridays when we have exams.

## Course Website

I will put most of my teaching material on our course site through Blackboard. After logging into your myUMBC, click on the “Blackboard” tab and then click on our course page in the “My Courses” area. You are responsible for all content delivered via Blackboard. You are *required* to log on to the course website *at least once between lectures*.

You will use the website for:

- Checking the *Announcements*.
- Accessing *Course Materials*: syllabus, homework, lectures notes, etc.
- Checking the *Grades* that you have earned.
- Interacting with the instructor and others online using the *Discussion Board*

If you have any questions about Blackboard accessibility or problems with Blackboard itself submit an [RT Ticket](#) and click on Blackboard under the Computer & Technology tab.

## Discussion Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	
8:00				8:00-9:50 PM Section 07 (5954) UC Cory* & Phoebe		
8:30						
9:00						
9:30						
...						
12:30				12:30-2:20 PM Section 04 (3357) UC Saurabh* & Brandon		
1:00			1:00-2:50 PM 121 H (4411) UC Dr. Meyer		Section 12 (6595) PY Cory* & Bella	
1:30						
2:00				2:30-4:20 PM Section 03 (3356) UC Noah* & Juan	Section 08 (6590) PY Aamil* & Justin	
2:30						
3:00						
3:30						
4:00						
4:30			4:30-6:20 PM Section 06 (3359) UC Noah* & Phoebe Section 14 (6597) PY Dr. Takacs* & Ben	4:30-6:20 PM Section 05 (3358) UC Saurabh* & Ben Section 13 (6596) PY Aamil* & Juan		
5:00						
5:30						
6:00			6:30-8:20 PM Section 02 (3355) UC Cory* & Justin Section 11 (6594) PY Aamil* & Brandon	6:30-8:20 PM Section 09 (6592) PY Saurabh* & Bella		
6:30						
7:00						
7:30						
8:00						
8:30						

Notes: UC: University Center 115D | PY: Physics 226 | \*: Discussion Instructor

Instructor E-mail:

Dr. Meyer: meyer@umbc.edu

Cory Nunn: cnunn1@umbc.edu

Noah Sienkiewicz: noahs3@umbc.edu

Saurabh Shringapure: ni95333@umbc.edu

Aamil Shaik: ashaik4@umbc.edu

Dr. Takacs: takacs@umbc.edu

Office hours in: TBA

Dr. Meyer: TBA

Cory Nunn: TBA

Noah Sienkiewicz: TBA

Saurabh Shringapure: TBA

Aamil Shaik: TBA

Dr. Takacs: TBA

## Weekly Schedule

Week	Date	Lecture Topic	Textbook	Discussion
1	Jan 29 (M)	Course Introduction; Vectors, Displacement, & Distance	Ch1: 1-7	Vectors
	Jan 31(W)	Speed, Velocity & Acceleration	Ch2: 1-2	
	Feb 2 (F)	<b>Quiz 1</b> , 1-D Kinematics	Ch2: 3	
2	Feb 5 (M)	Free Fall	Ch2: 3	1-D Kinematics
	Feb 7 (W)	Projectile Motion	Ch3: 1-2	
	Feb 9 (F)	<b>Quiz 2</b> , Relative Motion & Circular Motion	Ch3: 1;3	
3	Feb 12 (M)	Forces, Mass, & Newton's 1 <sup>st</sup> and 2 <sup>nd</sup> Laws	Ch4: 1-5	2-D Kinematics
	Feb 14 (W)	Free-body Diagrams & Newton's 3 <sup>rd</sup> Law	Ch4: 6-8	
	Feb 16 (F)	<b>Quiz 3</b> , Friction	Ch5: 1	
4	Feb 19 (M)	Newton's Laws: Problem Solving	Ch5: 3	Newton's Laws
	Feb 21 (W)	Motion along a Curved Path		
	Feb 23 (F)	<b>Quiz 4</b> , Newton's Laws: Problem Solving		
5	Feb 26 (M)	Scalar (Dot) Product, Work & Kinetic Energy	Ch6: 1-3	Newton's Laws
	Feb 28 (W)	Applications: Work	Ch6: 1-3	
	Mar 2 (F)	<a href="#">Exam 1 (Chapters 1-5), 8:00 - 8:50 AM, location TBA</a>		
6	Mar 5 (M)	Work-Kinetic Energy Theorem	Ch6: 4	Work & Kinetic Energy
	Mar 7 (W)	Potential Energy & (Non-)Conservative Forces	Ch7: 1-2	
	Mar 9 (F)	<b>Quiz 5</b> , Conservation of Energy	Ch7: 3	
7	Mar 12 (M)	Newton's Law of Gravity & Gravitational Potential Energy	Ch11: 2-3	Conservation of Energy
	Mar 14 (W)	Center of Mass	Ch5: 5	
	Mar 16 (F)	<b>Quiz 6</b> , Momentum	Ch 8: 1	
8	Mar 19-23	Spring Break		
9	Mar 26 (M)	Conservation of Momentum	Ch8: 2	Momentum and Impulse
	Mar 28 (W)	Collisions & Impulse	Ch8: 3	
	Mar 30 (F)	<b>Quiz 7</b> , Applications: Collisions		
10	Apr 2 (M)	Rotational Kinematics	Ch9: 1	Collisions: Elastic & Inelastic
	Apr 4 (W)	Rotational Kinetic Energy & Moment of Inertia	Ch9: 2-3	
	Apr 6 (F)	<a href="#">Exam 2 (Chapters 6-8 &amp; 11), 8:00 - 8:50 AM, location TBA</a>		
11	Apr 9 (M)	Torque	Ch9: 4	Rotational Kinematics
	Apr 11 (W)	Rotational Dynamics	Ch9: 5	
	Apr 13 (F)	<b>Quiz 8</b> , Rolling With and Without Slipping	Ch9: 6	
12	Apr 16 (M)	Rotational Dynamics: Problem Solving	Ch12: 1-3	Rotational Dynamics
	Apr 18 (W)	Static Equilibrium	Ch12: 1-3	
	Apr 20 (F)	<b>Quiz 9</b> , Static Equilibrium: Problem Solving		
13	Apr 23 (M)	Angular Momentum	Ch10: 1-2	Static Equilibrium
	Apr 25 (W)	Conservation of Angular Momentum	Ch10: 3	
	Apr 27 (F)	<b>Quiz 10</b> , Angular Momentum: Problem Solving		
14	Apr 30 (M)	Simple Harmonic Motion: Mass on a Spring	Ch14: 1-2	Angular Momentum
	May 2 (W)	Simple Harmonic Motion: Applications		
	May 4 (F)	<a href="#">Exam 3 (Chapters 9-10 &amp; 12), 8:00 - 8:50 AM, location TBA</a>		
15	May 7 (M)	Simple Harmonic Motion: Simple & Physics Pendulum	Ch14: 3	Simple Harmonic Motion
	May 9 (W)	Density & Pressure	Ch13: 1-2	
	May 11 (F)	<b>Quiz 11</b> , Buoyancy & Archimedes' Principle	Ch13: 3	
16	May 14 (M)	Review		No discussion
Final	TBA	<a href="#">Final Exam (comprehensive), date TBA, plan to be on campus until May 23</a>		

*The above schedule is tentative and may be adjusted throughout the semester.*