

PHYS 121: Introductory Physics I — Spring 2019

Instructor: Dr. Goolsby-Cole

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 to familiarize yourself with course policies. 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 | Office: Physics 323
- Office Hours: M & W 12-12:50 PM; Th 10-11 AM, or by appointment. My office hours will be in the Physics Tutorial Center room 226A — NOT my office.

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.

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, 6th 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 or 410-455-2695.
- You will use an online recourse 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 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, computers, or any other mobile device will be permitted during exams or discussions.

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 (Exam 1)
- Apply Newton's laws to solve problems related to motion and force (Exam 2)
- Apply principles of energy to solve mechanics problems (Exam 3)
- Apply conservation of momentum to solve problems related to collisions (Exam 3)
- Apply Newton's 2nd law for rotation to solve rotational dynamics problems (Exam 4)
- Solve problems related to static equilibrium (Exam 4)
- Apply conservation of angular momentum to solve problems (Exam 4)
- Apply Newton's laws and principles of energy to solve problems related to simple harmonic motion (Final)

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. As a general rule for college courses, you should be spending 3x as much time studying outside of the classroom as you spend in the classroom. This translates to around 9 hours of intensive effort outside of the class each week.
- Physics is primarily about applying concepts and problem-solving. It is not about memorization, though you will of course need to memorize somethings. Even though getting the final answer is important, it is much more important to understand the process by which 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	4%
Clicker	5%
Weekly Quiz	5%
Homework	8%
Discussion	8%
Exams (2 @ 10% 2 @ 15%)	50%
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

- Exams 1 & 2 will be worth 10% each of your overall grade since they will cover fewer topics. Exams 3 & 4 will be worth 15% each.
- 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.

FlipIt Physics: Pre-Lecture & Checkpoint

- The primary source material in our class will come from FlipIt Physics. FlipIt has lecture videos associated with each of the 23 units we will cover, and it is important to watch these videos and answer the checkpoint questions prior to every lecture. Your in-class comprehension of the material will be much more efficient if you have already been exposed to it. Class time will mostly be spent on clarifying and applying this material, and not on introducing the material itself.
- As a general rule, the FlipIt Physics pre-lectures and checkpoints will be due on Mondays and Wednesdays at 8:00 AM, though the due dates may be adjusted on occasion.

Class Time & Clickers

- An important aspect for your success in our class will be active engagement in the classroom which will involve applying the concepts from the FlipIt Physics videos in class. I expect everyone to come to class prepared to apply the concepts and equations you saw in the videos. A good way to prepare is to take notes while you are watching the videos which you can then use in class.
- Clickers will be used to track attendance and promote active learning by providing instant feedback for both myself and for you. Clicker questions will be graded on both participation and accuracy. In addition, there will be “reading quizzes” (really watching quizzes) at the beginning of class based on the FlipIt Physics unit we will cover that day. These reading quizzes will consist of short clicker questions assessing basic knowledge of the content such as definitions, units, concepts, equations, and simple application of equations.
- 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 credit for that day. Be sure to have extra batteries for it as well.
- Laptops and cellphones are not permitted during class for the primary reason that they are a distraction to other students. If you have accommodations allowing you to use a computer in class, you must e-mail me at the beginning of the semester letting me know.
- If you miss any classes, you are still responsible for the material covered.

Quizzes

- Weekly quizzes are given on Fridays at the end of class covering material from the last quiz or exam as well as material from that week's homework assignments and discussion.
- You are not allowed to use any resources for the quiz (such as notes, cellphones, or laptops) except for your calculator. The quizzes are not open neighbor — they are individual quizzes.
- 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. You will only have a finite amount of time (15-20 minutes) to complete quizzes which helps to prepare you for the finite amount of time for exams (50 minutes). Finally, quizzes are individual since that is how you will be taking the exams and you want to see if *you yourself* know how to solve a particular problem — not if you can solve that problem in a group.

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 FlipIt Physics online system. As a general rule, assignments will be due on Tuesdays & Thursdays at 11:59 PM, though the due dates may be adjusted on occasion. See the complete schedule on the FlipIt Physics website. You are allowed five 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 responsibility to fully understand the material. Even though homework constitutes 8% of your overall grade, exams and quizzes – for which you are solely responsible - make up the majority at 75%.
- 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.

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 based mainly on effort with part of your grade based on accuracy. The exact proportions are decided after each discussion with 1-3 pages of the discussion graded for accuracy.
- Attendance at the discussion is mandatory and full attendance is required. If you arrive more than 5 minutes late to discussion, you will lose 10% of your discussion grade with an additional 10% penalty for each 5 minute increment you are late.
- 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.

Exams

- If you want to do well in this course, then you will have to do well on all the exams which constitutes 70% of your overall grade. The pre-lectures, classes, 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.

- Four 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. It will be sometime between May 16-22. If you currently have plans or make plans to leave prior to these dates, 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**: There is an extended deadline for all FlipIt assignments of 1 day 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.
- **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. Make-up exams are only given on the Monday following an exam from 12-12:50 PM.
- **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 and Wednesday 12:00-12:50 PM, and Thursday 2-3 PM in the Physics Tutorial Center room 226A.
- **Physics Tutorial Center (Physics 226A)**: TAs offer walk-in assistance Monday through Thursday 12-5 PM. The times for specific TAs 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.

Discussion Schedule

Coming Soon!

Weekly Class Schedule

Week	Date	FlipIt Unit & Class Topic	Textbook
1	Jan 28 (M)	Introduction & Unit 1: 1D Kinematics	Ch2: 1-3
	Jan 30 (W)	Unit 1: 1D Kinematics	Ch2: 1-3
	Feb 1 (F)	Unit 1: 1D Kinematics	Ch2: 1-3
2	Feb 4 (M)	Unit 2: Vectors & 2D Kinematics	Ch1: 6-7 Ch3: 1-2
	Feb 6 (W)	Unit 2: Vectors & 2D Kinematics	Ch1: 6-7 Ch3: 1-2
	Feb 8 (F)	Unit 3: Relative & Circular Motion	Ch3: 1-2
3	Feb 11 (M)	Unit 3: Relative & Circular Motion	Ch3: 1,3
	Feb 13 (W)	Unit 4: Newton's Laws	Ch4
	Feb 15 (F)	Exam 1 — FlipIt Units: 1-3	Ch 1-3
4	Feb 18 (M)	Unit 5: Forces & Free-body Diagrams	Ch4
	Feb 20 (W)	Unit 5: Forces & Free-body Diagrams	Ch4
	Feb 22 (F)	Unit 6: Friction	Ch5: 1,3
5	Feb 25 (M)	Unit 6: Friction	Ch5: 1,3
	Feb 27 (W)	Exam 2 Review	Ch 4-5
	Mar 1 (F)	Exam 2 — FlipIt Units: 4-6	Ch 4-5
6	Mar 4 (M)	Unit 7: Work & Kinetic Energy	Ch6: 1-4
	Mar 6 (W)	Unit 7: Work & Kinetic Energy	Ch6: 1-4
	Mar 8 (F)	Unit 8: Conservative Forces & Potential Energy	Ch7: 1-3
7	Mar 11 (M)	Unit 8: Conservative Forces & Potential Energy	Ch7: 1-3
	Mar 13 (W)	Unit 9: Work & Potential Energy Part II	Ch11: 2-3
	Mar 15 (F)	Unit 9: Work & Potential Energy Part II	Ch11: 2-3
8	Mar 18-22	SPRING BREAK!	
9	Mar 25 (M)	Unit 10: Center of Mass	Ch5: 5
	Mar 27 (W)	Unit 11: Conservation of Momentum	Ch8: 1-2
	Mar 29 (F)	Unit 12: Elastic Collisions	Ch8: 3
10	Apr 1 (M)	Unit 13: Collisions, Impulse, & Reference Frames	Ch8: 3
	Apr 3 (W)	Exam 3 Review	Ch 5; 6-8; 11
	Apr 5 (F)	Exam 3 — FlipIt Units: 7-13	Ch 5; 6-8; 11
11	Apr 8 (M)	Unit 14: Rotational Kinematics & Moment of Inertia	Ch9: 1-3
	Apr 10 (W)	Unit 15: Parallel Axis Theorem & Torque	Ch9: 3-5
	Apr 12 (F)	Unit 15: Parallel Axis Theorem & Torque	Ch9: 3-5
12	Apr 15 (M)	Unit 16: Rotational Dynamics	Ch9: 5
	Apr 17 (W)	Unit 16: Rotational Dynamics	Ch9: 6
	Apr 19 (F)	Unit 16: Rotational Dynamics	Ch9: 6
13	Apr 22 (M)	Unit 17: Rotational Statics	Ch12: 1-3
	Apr 24 (W)	Unit 18: Rotational Statics Part II	Ch10: 1-3
	Apr 26 (F)	Unit 19: Angular Momentum	Ch10: 1-3
14	Apr 29 (M)	Unit 20: Angular Momentum Vector & Precession	Ch10: 1-3
	May 1 (W)	Unit 20: Angular Momentum Vector & Precession	Ch10: 1-3
	May 3 (F)	Exam 4 — FlipIt Units: 14-20	
15	May 6 (M)	Unit 21: Simple Harmonic Motion	Ch14: 1-2
	May 8 (W)	Unit 22: Simple & Physical Pendula	Ch14: 3
	May 10 (F)	Unit 23: Fluid Statics	Ch13: 1-3
16	May 13 (M)	Unit 23: Fluid Statics	Ch13: 1-3

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

Discussion Schedule

Week	Date	Discussion Material	FlipIt Unit
1	Jan 30-31	D1: Math Review & 1D Kinematics	1
2	Feb 6-7	D2: 2D Kinematics & Vectors	1-2
3	Feb 13-14	D3: Relative and Circular Motion & Newton's Laws	3-4
4	Feb 20-21	D4: Forces & Free-body Diagrams	4-5
5	Feb 27-28	D5: Friction	6
6	Mar 6-7	D6: Work & Kinetic Energy	7
7	Mar 13-14	D7: Potential Energy & Conservation of Energy	8-9
8	Mar 21-22	SPRING BREAK	
9	Mar 27-28	D8: Center of Mass & Conservation of Momentum	10-11
10	Apr 3-4	D9: Elastic Collisions & Impulse	12-13
11	Apr 10-11	D10: Rotational Kinematics & Moment of Inertia	14-15
12	Apr 17-18	D11: Rotational Dynamics	16
13	Apr 24-25	D12: Rotational Statics	17-18
14	May 1-2	D13: Angular Momentum	19-20
15	May 8-9	D14: SHM & Pendulua	21-22

Quiz & Exam Schedule

Week	Date	Quiz & Exam Schedule and Material	FlipIt Unit
1	Feb 1	Quiz 1: Math Review/1D Kinematics	1
2	Feb 8	Quiz 2: 2D Kinematics	2
3	Feb 15	Exam 1: Kinematics and Relative & Circular Motion	1-3
4	Feb 22	Quiz 3: Newton's Laws	4-5
5	March 1	Exam 2: Newton's Laws of Motion	4-6
6	March 8	Quiz 4: Work & Kinetic Energy	7
7	March 15	Quiz 5: Potential Energy	8-9
8	March 22	SPRING BREAK	
9	March 29	Quiz 6: Center of Mass & Momentum	10-11
10	April 5	Exam 3: Energy & Momentum	7-13
11	April 12	Quiz 7: Rotational Kinematics & Moment of Inertia	14
12	April 19	Quiz 8: Parallel Axis Theorem & Rotational Dynamics	15-16
13	April 26	Quiz 9: Rotational Statics	17-18
14	May 3	Exam 4: Rotational Dynamics	14-20
15	May 10	Quiz 10: Simple Harmonic Motion & Pendula	21-22
Final	May 16-22	Final Exam	1-23

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