PHYS 121
Introductory Physics I
Dr. Eric C. Anderson
UMBC•Spring•2023
Syllabus

•Getting ready•

******Action items******

Prerequisites•You must have completed Math 151, or be enrolled in it this semester.

Workload•Experience shows that success requires 8-12 hours per week of intensive effort outside of scheduled class time, consistent with the usual higher education expectation of 2-3 hours outside of class for each credit hour.

Course Materials•

FlipItPhysics by Gary Gladding et al is the main resource for Phys 121 and 122.

******Enroll in* FlipIt Physics*****: In Blackboard, on the left toolbar, click *Course Materials Initiative (CMI):* FlipIt Physics*, Supplemental source, and* Turning Technologies *subscription*. Choose *Get access to* FlipIt Physics *here.* You'll be prompted to enter your email address, then you'll be asked to enter a **Course code (AndersonSP2023)**, and your own **personal access code** that you received from no-reply@verbasoftware.com with the subject "*PHYS 121 FLIP IT PHYSICS CODE (CMI PROVIDED)"* on or around 25 Jan.

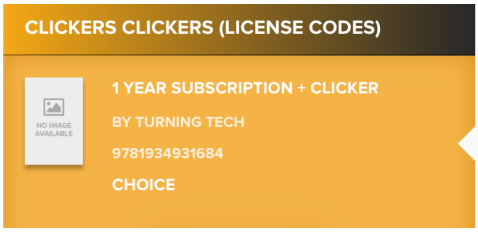
Supplemental source: Physics for Scientists and Engineers by Tipler. To access click *Course Materials Initiative (CMI)* …tab on the left toolbar in Blackboard, then click *My Textbooks & Course Resources*, and finally *Read Now*. Both the principal source (*FlipIt Physics*) and the supplemental source (Tipler) are provided through UMBC's Course Materials Initiative (CMI).

Turning Technologies (now called Point Solutions) for responding to questions during class using your smartphone or tablet/ipad.

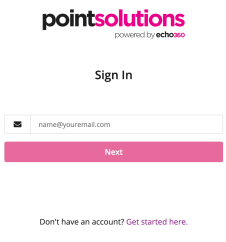
To obtain, 3 steps:

(1) ******Subscribe to* Turning Technologies*****

Click on the *CMI…* tab in Blackboard and choose *Obtain your Turning Technologies subscription here*. Set Term = Spring 23, Department = CLICKERS, Course = CLICKERS CLICKERS, Section = License Codes. Click on *Compare prices…* In the left panel, select 1 YEAR SUBSCRIPTION + CLICKER for $34.99. Add to cart and check out. Choose *Pick up at store* and it will be emailed to you. (Or, just go to the bookstore and purchase.)



(Note: If you already have a subscription from a previous course that extends through this term, no need for a new subscription.)



(Another note: We won't actually use the included physical "clicker", you only need the subscription; however, this is the cheapest way to obtain the subscription.)

(2) ******Register for* Turning Technologies*****

Click on the CMI… tab in Blackboard and choose *Register your Turning Technologies subscription here.*

(3) ******Install the* Point Solutions *app******

Install the (free) *Point Solutions* (formerly *Turning technologies*) app on your phone or tablet/ipad.

Other required items• Smartphone or tablet/ipad for responding to questions in class through *Turning Technologies/Point Solutions*. Computer with reliable internet access for *FlipIt*. (Many students find a tablet or ipad with note-taking software like *Notability* useful for taking notes in class and working on homework.)

Bring to class each day: Smartphone or tablet/ipad, pencil.

Staying in touch•Please, please, please… check Blackboard announcements DAILY for clarifications, updates, and advice.

Class• *Section 01* MWF 9-9:50 AM in Engineering 027
Section 10 MWF 11-11:50 AM in Physics 101

Discussion•Check your schedule for your weekly discussion meeting (beginning *first* week of semester). Here are your teaching assistants (TAs) and undergraduate learning assistants (LAs) who will lead your meetings:

Section	Location	Day and time	TA	LA
02	Interdisciplinary Life S 101	W 7:00-8:50 PM	*Eric*	*Dwina, Katherine*
03	Interdisciplinary Life S 101	Th 2:30-4:20 PM	*Eric*	*Sasha, Florence*
04	Interdisciplinary Life S 101	Th 12:30-2:20 PM	*Eric*	*Jackson, Katherine*
05	Interdisciplinary Life S 101	Th 4:30-6:20 PM	*Ansel*	*Nicholas, Jackson*
07	Interdisciplinary Life S 101	Th 8:00-9:50 AM	*Ansel*	*Sasha, Ben*
08	Interdisciplinary Life S 230	Th 2:30-4:20 PM	*Prof. Worchesky*	*Nicholas, Dwina*
09	Interdisciplinary Life S 201	Th 6:30-8:20 PM	*Dongli*	*Gabe, Sam*
11	Interdisciplinary Life S 201	W 7:00-8:50 PM	*Dongli*	*Kevin*
12	Interdisciplinary Life S 201	Th 12:30-2:20 PM	*Anderson*	*Ben, Kevin*
13	Interdisciplinary Life S 201	Th 4:30-6:20 PM	*Dongli*	*Florence, Sam*
14	Interdisciplinary Life S 101	W 5:00-6:50 PM	*Ansel*	*Laylor, Gabe*
Honors	Interdisciplinary Life S 233	W 1:00-2:50 PM	*Prof. Henriksen*	NA

Contact info•

TAs:

Eric M. (emasing1@umbc.edu)
Dongli D. (dedong1@umbc.edu)
Ansel L. (alavitz1@umbc.edu)
Prof. Worchesky (Dr.Worchesky@umbc.edu)

Instructor: Eric Anderson (andersoe@umbc.edu)

Learning goals•

General education program (GEP) goals: *This course addresses the GEP's functional competency* Scientific and Quantitative Reasoning. *It has been approved to meet the GEP* Sciences *distribution requirement.*

- 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.
- Recognize that mathematical, statistical, and scientific evidence requires evaluation.

Course goals:

- Solve 1-dimension and 2-dimension kinematics motion problems
- Apply Newton's laws to solve problems related to motion and force
- Apply energy principle to solve mechanics problems
- Apply conservation of momentum to solve problems related to collision
- Apply Newton's 2nd 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 energy principle to solve problems related to simple harmonic motion

Find more detailed learning goals for each unit in Blackboard under *Syllabus, learning goals, and equation sheet* tab.

•Methods•

***FlipIt Physics* prelectures and checkpoints•**View through the *FlipItPhysics* website. Respond to prelecture questions and checkpoint questions (multiple-choice items checking your understanding.) Due most class days at 8:50 AM (see day-by-day guide at the end of syllabus). Earn 80% of possible points for full credit.

Wise counsel: It pays to spend the WHOLE 20 or 25 minutes viewing the prelecture for a unit. Most of your learning will come with practice *applying* the material later (in class, discussion, and homework), but the prelectures provide an essential foundation.

Class and class participation•Starting with the ideas presented in *FlipIt* prelectures; class offers opportunities for you to deepen your conceptual understanding and develop your problem-solving skills.

Participation grade most class days, usually through (1) responding to the day's questions via *Turning Technologies/Point solutions* on your smartphone or tablet/ipad (full credit just for responding, not for getting it right), but occasionally for (2) completing and submitting a provided worksheet (full credit for evidence of preparation - did you attentively go through the prelectures? - and solid effort). *Working together with your peers strongly encouraged.* Six lowest class participation grades dropped.

Life hack: Find the pdf lecture outline the evening before each class on BB under *Course Materials*. Print it out and take notes or annotate it on your tablet; don't spend our time together writing down what's projected on the screen. Listen, think, discuss. Don't forget your pencil and smartphone or tablet/ipad!

Discussion•Designed to help you develop and refine your problem-solving skills with the help of your group, your TA, and your LAs. You'll work on and submit a written discussion packet each week, graded on a 7-point basis:

Contribution to group effort:

3 Attended full session, engaged in group effort all or most of session
2 Attended majority of session, and participated with group majority of session
1 Missed more than half of session, or disengaged with group most of session
0 Missed all or most of session

Quality of written responses:

3 Applies appropriate concepts and frameworks (as presented in prelecture and class) most of the time, and carries out valid analyses the majority of the time, and *quantity*[*] satisfactory (got at least as far as the majority of groups)

2 Applies appropriate concepts and frameworks the majority of the time, carries out valid analyses some of the time, and *quantity* adequate (at least close to the majority of groups)

1 Rarely applies appropriate concepts and frameworks, or rarely carries out valid analyses, or quantity lacking (attempts far less than most groups)

0 Mostly missing or mostly incorrect approaches

[*]*In general, groups are not expected to plow through a discussion packet to the end within the 1 hr 50 min time frame for discussion. We try to provide enough material to challenge even the most resolute groups. Focus on* quality*: work together to practice applying appropriate concepts and frameworks presented in prelecture and class, and take the time to make sure all group members are on board. Items near the end of the packet are there for you if you're ready: for reinforcement and more advanced practice.*

Complete and correct solution to selected item

1 Complete and correct response
0.5 Some missing or incorrect analysis
0 Blank, or unsuitable approach

Best 12 of 14 count. You must attend discussion to submit. Solutions posted on Blackboard under *Discussion materials* tab each Thursday at 9 PM.

How to prepare for discussion? Simple: Keep up with FlipIt *and class, so that you're ready to practice applying what you've begun to learn.*

***FlipIt Physics* homework (HW)•**HW assignments are designed to build conceptual understanding and problem-solving skills through systematic practice and feedback. Due (online, through *FlipItPhysics*) most Tuesdays and Thursdays at midnight. You're allowed 5 attempts for each numerical item. Your response must be within 1% of the correct answer, so enter at least three significant figures, and don't round any intermediate results. Earn 80% of possible points for full credit. HW assignments offer additional deadlines (up to 24 hrs late for 90% credit; up to 24-48 hrs late for 80% credit.) Keep a careful written record of your work for future studying.

Pro tips: Use FlipIt prelecture examples, the supplementary text (Tipler), collaborate with classmates, come to Physics Tutorial Center or SI PASS sessions for help. Searching for solutions online is less productive; you may manage to get the HW points with minimal effort, but miss the larger goal of mastering the material for the exams. Have the equation sheet (under the Syllabus, learning goals, and equation sheet *tab) at hand.*

Exams•6 exams. Expect multiple-choice and other objective items, short free-response items, some qualitative and some quantitative, and a bigger free-response problem or two affording significant partial credit. Equation sheet provided (see the Blackboard tab *Syllabus, learning goals, and equation sheet.*) Calculator allowed. *Given at 8 AM, in multiple lecture halls; check Blackboard for your assigned lecture hall and seat.*

****Optional****Flub an exam? During your last discussion sign up for a redo (another exam over the same material). Offered 8 AM Mon 15 May. Average of your original score and your redo score replaces your original score (if higher).

Final exam•Similar to exams, comprehensive.

•Policies•

Grading•5% for *FlipIt* prelectures/checkpoints, 7.5% for *FlipIt* homework, 7.5% for discussion, 7.5% for class participation (responding to questions using your Turning subscription and completing in-class worksheets), 10% for each of 6 exams, 12.5% for final exam. 89.5% required for A, 79.5% for B, 69.5% for C, and 59.5% for D.

Reclaiming and reviewing work•Exams and discussion packets are returned to you in discussion. Exam solutions are posted on Blackboard at 5 PM after each exam. Please review graded work right away, and check that we enter your grades correctly. *Notify us of any grading mistakes within a week*: Contact your discussion TA about discussion grade mistakes. Get exams to me directly, or through the Physics Department office (Physics 221), along with a note describing the mistake. (For errors in assigning partial credit, make sure that you've examined the posted solutions and the grading sheet, and that your note explicitly addresses the discrepancy. Your entire exam will be regraded.)

Late and missed work•It's expected that technical difficulties, illness, or attention to family matters may get in the way of completing your work from time to time. Therefore earning 80% of possible points on *FlipIt* prelectures/checkpoints and *FlipIt* HW will get you full credit. Examples: You earn 84% of possible HW points? That becomes 100%. You earn 71% of possible HW points? That becomes (71/80)*100% = 89%. In addition, completing *FlipIt* HW up to 24 hrs late gets you 90% of possible points, and up to 48 hrs late 80% of possible points. In addition, your lowest two discussion grades will be dropped, and lowest six class participation grades will be dropped. If you must miss an exam due to officially sanctioned UMBC activities, illness, family emergency, detention by authorities, or another difficulty, contact me as soon as possible. With written verification of the cause of your absence, I'll arrange a makeup over the same material. Do let me know as soon as you can of any documented extended illness or family responsibilities that may impact your ability to keep up in the class, and we'll try to make a plan to keep you on track to succeed.

Academic integrity•A*cademic integrity is an important value at UMBC. By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.* All instances of academic misconduct will be addressed according to the UMBC Policy on Academic Integrity (https://www.umbc.edu/policies/pdfs/UMBC%20III%201.10.03%20Undergraduate%20Student%20Academic%20Conduct%20Policy.pdf) Examples include attempting to make use of disallowed materials on 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.)

•Getting help•

Monitor your performance•The best indicator of your current grade in the course is the "weighted total" that may be found in Blackboard in *MyGrades*. Lowest discussion and participation grades will be dropped late in the semester. *FlipIt* (12.5% of your final course grade) will be factored into your weighted total at the end of semester.

Drop by the Physics Tutorial Center (PTC)•Physics 226A, open 12 – 5 PM Monday through Thursday. Staffed by instructors and graduate TAs. My own hours in the PTC are Mondays 1 – 2 PM, Tuesdays 12 – 2 PM, Wednesdays 2 – 3 PM, from Tues 31 Jan through Tues 16 May.

Try practice exams•Recent exams provided on blackboard under *Exam practice* along with solutions. Best to print out and try to replicate exam conditions (only calculator and equation sheet, 50 min time limit.) Consult solutions after a solid effort on your own.

Hop on the Discord server•To discuss class and discussion material and prepare for exams. Details forthcoming on Blackboard.

Supplemental Instruction Peer assisted study sessions (SI PASS)•A successful peer from a recent semester leads twice-weekly study sessions. More info on Blackboard.

UMBC's Academic Success Center (ASC) •Provides a range of resources to support students as they progress toward degree completion. The ASC has created a specialized set of Online Learning Resources. In addition, check out the following resources:

- Academic Success Center Resources include: Online tutoring and writing support, supplemental instruction peer-assisted study sessions (SI PASS), placement testing, FYI academic alerts, success courses, academic advocacy, academic policy and academic success meetings.
- Tutoring and Writing Center Appointments
- Academic Advocates: Advocates work one-on-one with students who need support navigating academic and institutional challenges, no matter how complex the concerns (i.e., personal, academic, or financial).
- Academic Success Meetings - Schedule a one-to-one virtual meeting with an Academic Success Center Professional who can help you with time management, study skills, and accessing campus resources.

If you have a question, please contact the ASC at academicsuccess@umbc.edu

Technology Support Center•Offers help with technology-related concerns.

Student Disability Services (SDS)•UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA) of 1990, the ADAAA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow for students to have equal access and inclusion in all courses, programs, and activities at the University. If you have a documented disability and would like to request academic accommodations, please refer to the SDS website for registration information and to begin the process. For any questions or concerns, you may contact us through email at disAbility@umbc.edu or phone at (410) 455-2459.

Something else?•Please email me (andersoe@umbc.edu) and I'll try to help.

•Day-by-day guide•

FlipIt Physics prelecture/checkpoints, Discussion, *FlipIt Physics* Homework (HW), Exams, Supplemental source: (Tipler), No meetings

Week of:	Monday	Wednesday	Discussion (Wed or Thur)	Friday
30 Jan - 3 Feb	***Special*** Blackboard syllabus quiz due Monday 8:50 AM ***Special*** **Welcome to the course**	*Motion* Unit 1 One-dimensional kinematics (1.3-4, 2.1-4)	Unit 1	Unit 1 One-dimensional kinematics (continued)
6-10 Feb	Unit 2 Vectors and two-dimensional kinematics (1.6-7, 3.1-2) Unit 1 HW (due Tues midnight)	Unit 2 Vectors and two-dimensional kinematics (continued) Unit 2 HW (due Thurs midnight)	Unit 2	Unit 3 Relative and circular motion (3.1, 3)
13-17 Feb	*Force* Unit 4 Newton's Laws (4.1-5,7) Unit 3 HW (due Tues midnight)	Unit 5 Forces and free-body diagrams (4.6,8, 5.3)	Unit 3	Exam 1 Motion (Units 1-3) 8 AM No class
20-24 Feb	Unit 5 Forces and free-body diagrams (continued) Unit 4 HW (due Tues midnight)	Unit 5 Forces and free-body diagrams (continued) Unit 5 HW (due Thurs midnight)	Units 4-5	Unit 6 Friction (5.1)
27 Feb - 3 Mar	Unit 6 Friction (continued) Unit 6 HW (due Tues midnight)	*Energy* Unit 7 Work and kinetic energy (6.1-4, 11.2-3)	Unit 6	Exam 2 Force (Units 4-6) 8 AM No class

6-10 Mar	Unit 8 Conservative forces and potential energy (7.1-3, 11.2-3) Unit 7 HW (due Tues midnight)	Unit 8 Conservative forces and potential energy (continued) Unit 8 HW (due Thurs midnight)	Units 7-8	Unit 9 Work and potential energy II (7.1-3, 11.2-3)
13-17 Mar	Unit 9 Work and potential energy II (continued) Unit 9 HW (due Tues midnight)	*Momentum* Unit 10 Center of mass (5.5, 6.5)	Unit 9	Exam 3 Energy (Units 7-9) 8 AM No class
20-24 Mar				
27-31 Mar	Unit 11 Conservation of momentum (8.1,3) Unit 10 HW (due Tues midnight)	Unit 11 Conservation of momentum (continued) Unit 11 HW (due Thurs midnight)	Units 10-11	Unit 12 Elastic collisions (8.3-4)
3-7 Apr	Unit 13 Collisions, impulse, and reference frames (8.2-3) Units 12-13 HW (due Tues midnight)	*Rotation* Unit 14 Rotational kinematics and moment of inertia (9.1-3)	Units 12-13	Exam 4 Momentum (Units 10-13) 8 AM No class
10-14 Apr	Unit 15 Parallel axis theorem and torque (9.3-4) Unit 14 HW (due Tues midnight)	Unit 15 Parallel axis theorem and torque (continued) Unit 15 HW (due Thurs midnight)	Unit 14-15	Unit 16 Rotational dynamics (9.4-6)
17-21 Apr	Unit 16 Rotational dynamics Unit 16 HW (due Tues midnight)	Unit 16 Rotational dynamics	Unit 16	Exam 5 Rotation (Units 14-16) 8 AM No class
24-28 Apr	*Statics* Unit 17 Rotational statics (12.1-5) Unit 17 HW (due Tues midnight)	Unit 18 Rotational statics II (12.1-5) Unit 18 HW (due Thurs midnight)	Units 17-18	Unit 18 Rotational statics II (continued)

1-5 May	*Angular momentum* Unit 19 Angular momentum (10.1-3) Unit 19 HW (due Tues midnight)	Unit 19 Angular momentum (continued)	Unit 19	Exam 6 Statics and Angular momentum (Units 17-19) 8 AM No class
8-12 May	*Simple harmonic motion* Unit 20 Simple harmonic motion (14.1-3)	Unit 20 Simple harmonic motion (continued)	Unit 20	Unit 20 Simple harmonic motion (continued)
15-19 May	Exam *n* Redo (optional) 8 AM No class Unit 20 HW (due Tues midnight)			Final Exam: Units 1-20 (Date, time, and locations to be determined)