PHYS 121
Introductory Physics I
Dr. Eric C. Anderson
UMBC•Spring•2021
Syllabus

•Getting ready•

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.

Required items•

Principal source: *FlipItPhysics* by Gary Gladding et al, ISBN: 9781429272438. Course access key: AndersonSP2021.You should have received a personal access code by email (from no-reply@verbasoftware.com on 8 Jan with subject line "SPRING 21 ACCESS CODES! (CMI)" and on 15 Jan with subject line "S21 PHYS 121/121H FLIP IT CODES (CMI)"). To enroll click *Course Materials Initiative (CMI)/FlipIt Physics)* In BB. Supplemental source: *Physics for Scientists and Engineers* by Tipler. To access click *Course Materials Initiative (CMI)/Physics for Scientists and Engineers* in BB. Both the principal source (FlipIt Physics) and the supplemental source (Tipler) are provided through UMBC's Course Materials Initiative (CMI). For more information on CMI contact the UMBC Bookstore.

Computer with reliable access to internet. Scanner or camera and software like *CamScanner* to create pdf from scanned image or photo OR tablet/ipad and note-taking software like *Notability*. Microphone and webcam very helpful for discussion and office hours. Chrome browser advised for best compatibility with BB.

Required (synchronous) times•

Weekly quiz: Through BB, Fridays 8-8:50 AM.

Weekly discussion: Check your schedule for your weekly discussion meeting, in BB Collaborate (beginning week of 25 Jan). Your graduate teaching assistants (TAs) and undergraduate learning assistants (LAs) will lead your meetings:

Section	Day and time	TA	LA
02	W 6:30-8:20 PM	*Aamil S.*	*Matthew*
03	Th 2:30-4:20 PM	*Max A.*	*Brian*
04	Th 12:30-2:20 PM	*Aamil S.*	*Laylor*
05	Th 4:30-6:20 PM	*Max A.*	*Esther*
06	W 4:30-6:20 PM	*Max A.*	*Matthew*
07	Th 8:00-9:50 AM	*Binod J.*	*Esther, Kenneth*
08	Th 2:30-4:20 PM	*Aditya T.*	*Laylor*
09	Th 6:30-8:20 PM	*Aditya T.*	*Precious*
11	W 6:30-8:20 PM	*Akram I.*	*Talia*
12	Th 12:30-2:20 PM	*Binod J.*	*Brian*
13	Th 4:30-6:20 PM	*Aamil S.*	*Precious, Avion*
14	W 4:30-6:20 PM	*Akram I.*	*Talia*

Contact info•

TAs: Max Aifer (maifer1@umbc.edu), Akram Ibrahim (akrami1@umbc.edu), Binod Joshi (binodj1@umbc.edu,) Aamil Shaik (ashaik4@umbc.edu), Aditya Thapa (adityat1@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 multimedia learning modules (MLMs) through the *FlipItPhysics* website. Respond to prelecture questions and checkpoint questions (multiple-choice items checking your understanding of the MLM content.) Due *each Friday* at 1 PM and *some Mondays* at 1 PM (see day-by-day guide at the end of syllabus). Earn 80% of possible points for full credit.

Life hack: 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, but the prelectures provide your foundation.

Lectures and lecture questions•After completing a unit's *FlipIt Physics* prelectures/checkpoints, view the associated asynchronous lecture posted on BB under *Lectures and lecture questions*; my attempt to summarize the essential points from the prelecture and guide you through some initial practice applying the basic ideas. Follow with a short BB test (located under the same tab) in which you'll respond to several questions about the lecture. You're allowed three attempts so it shouldn't be too hard to earn all the points. Due *each Friday* at 1 PM and *some Mondays* at 1 PM (see day-by-day guide at the end of syllabus).

Suggestion: Use scheduled lecture time (9-9:50 AM or 11-11:50 AM) to complete FlipIt Physics prelectures/checkpoints, and the subsequent UMBC "free hour" (12-1 PM, no scheduled classes) to complete lectures/lecture questions.

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*) Wednesdays at 1 PM. You're allowed 5 attempts for each numerical item; your response must be within 1% of the correct answer. Earn 80% of possible points for full credit. *FlipIt* sometimes offers additional feedback after the deadline. HW assignments offer a second deadline Fri at 8 AM for 80% credit. Keep a careful written record of your work for future studying.

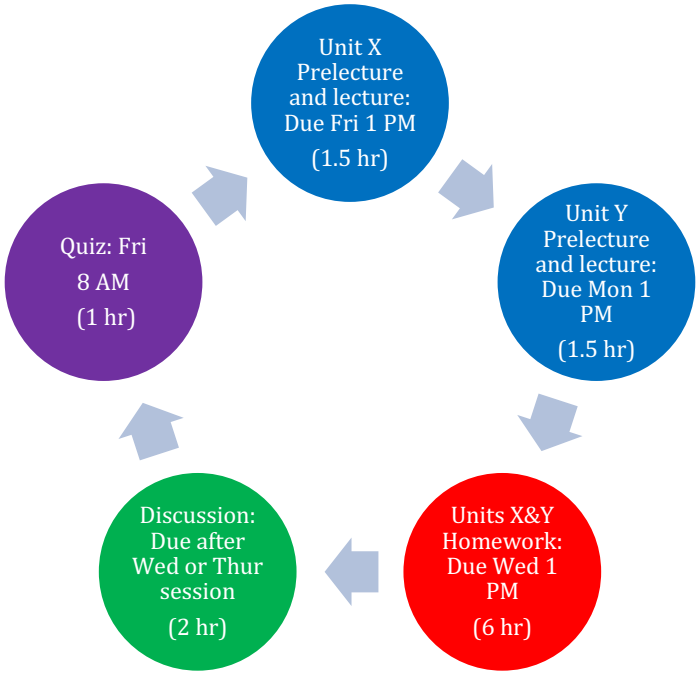
Pro tips: Use resources within FlipIt (prelecture examples, video solutions given for some HW problems), the supplementary text (Tipler), collaborate with classmates, attend instructor or TA homework help sessions or SI/PASS sessions for help. Searching for solutions online is less productive; you may manage to get the HW points with minimal effort, but miss the larger goal of mastering the material for the weekly quiz. Have the equation sheet (under the Syllabus, learning goals, and equation sheet *tab) at hand.*

Discussion•Attend via BB Collaborate on Wednesday or Thursday, according to your class schedule. You'll practice items in small groups designed to help you master the week's one or two units, to be covered in Friday morning's quiz. Locate in BB under *Discussion materials*, available before start of discussion. Submit your discussion solutions individually, due 10 minutes after the end of discussion via BB under *Discussion materials*. Options for completing and submitting: (1) Print materials and write out responses, or (2) Write out responses on clearly labeled plain paper. Either way, scan or take a photo, make sure it's legible, and upload to your computer. For those of you with tablets or ipads, here's an even better option: Download discussion materials and open in a note-taking app like *Notability*. Complete on your device. To upload: Under *Assignment Files*, click "Browse my computer". Acceptable formats include pdf (preferred), jpg, and jpeg. Grade is based half on full attendance and participation in your group, and half on your individual solutions.

Quizzes•13 graded quizzes, given each Friday at 8 AM via BB under *Quizzes* tab. Each quiz consists of two 20-minute parts, to be started at 8:00 AM and 8:25 AM (15-minute window to start each; start the first part between 8:00 and 8:15 AM, start the second part between 8:25 and 8:40 AM.) Expect a mix of qualitative and quantitative questions (multiple choice, multiple answer, matching, numerical answer, etc.) addressing *primarily* the one or two units for which you completed the HW on Wednesday, but *all previous material* as well. Quizzes are "open book" – you're free to refer to your notes and any class materials, but strictly individual – you must not attempt to communicate with anyone or consult online resources outside of class materials. Please contact me if you have any questions about what is permitted. Be sure to have a scientific calculator handy (or online equivalent, or smartphone app.)

Final exam•Similar to quizzes, comprehensive. Time and date to be announced on BB.

•Typical weekly cycle, with expected minimum time commitment•



•Policies•

Grading•5% for *FlipIt* prelectures/checkpoints, 5% for lecture questions, 10% for *FlipIt* homework, 10% for discussion, 60% for quizzes, 10% for final exam. 90% required for A, 80% for B, 70% for C, and 60% for D.

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* prelectures/checkpoints up to 48 hrs late, or completing *FlipIt* HW late (by Friday 8 AM instead of Wednesday 1 PM) gets you 80% of possible points. So if your HW is always late but always perfect you'll end up with a 100% HW grade.) In addition, two lecture question sets, two discussions, and two quizzes will be dropped. (Actually, since each quiz consists of two parts, four quiz "parts" will be dropped.) That being said, make sure to regularly test and maintain your technology, and make contingency plans (e.g., get to your local public library parking lot in case of an internet outage), to minimize technical issues. 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•Honor pledge required for each quiz and the final exam: *I will not make use of any materials other than materials provided for or created for this class. I will not communicate with or attempt to communicate in any way with anyone during this quiz (8 AM - 9 AM). This includes but is not limited to accessing websites designed to assist students, contributing to or monitoring social media, and speaking to or sharing written materials with others physically present. The work on this quiz is entirely my own. Please respond "I affirm" in order to receive credit for this quiz.* All instances of academic misconduct will be addressed according to the UMBC Policy on Academic Integrity. Penalties range from a grade of 0 on a quiz 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 expected grade in the course is the "weighted total" that may be found in BB in *MyGrades*. As described above in *Late and missed work* your lowest two lecture question grades, your lowest two discussion grades, and your two lowest quiz grades will be dropped, but not until the end of the semester. *FlipIt* (15% of your final course grade) be factored into your BB weighted total at the end of semester. To review your quizzes, click on *MyGrades*, Quiz X Part 1 or 2, and click on Calculated Grade (link in blue).

Homework help sessions•Offered via BB Collaborate, check BB for times.

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

Quiz practice•Offered by instructor on BB Collaborate each Thur 7-7:50 PM.

UMBC's Academic Success Center (ASC) •Provides a range of resources to support students as they progress toward degree completion. They will continue to offer all of their services online. The ASC has created a specialized set of Online Learning Resources, including videos and guides to help students succeed while learning online. 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 will be online; students can make appointments.
- SI PASS Supplemental Instruction (SI)/ *Peer Assisted Study Sessions* (PASS). The SI PASS program targets traditionally difficult academic courses, providing regularly scheduled, out-of-class review sessions, happening in Blackboard Collaborate inside your existing Blackboard course.
- 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.

Special COVID-19 UMBC policies and resources•Please see this Google doc.

Something else?•Please email me (andersoe@umbc.edu) and I'll try to help, or I'll set a Webex meeting during a Monday or Friday free hour (12-1 PM)

•Day-by-day guide•

FlipIt Physics prelecture/checkpoints, asynchronous lecture/lecture questions. FlipIt Physics Homework (HW). Synchronous meeting. Quiz. Supplemental source: (Tipler)

Week of:	Due Mon 1 PM	Due Wed 1 PM	Discussion (Wed or Thur)	Fri 8-8:50 AM	Due Fri 1 PM
25-29 Jan		***Special*** **Wed at 9 or 11 AM** **Synchronous meeting on BB Collaborate**	Practice with preliminary ideas	Quiz 0: Preliminary ideas (ungraded)	*Motion* Unit 1 One-dimensional kinematics (1.3-4, 2.1-4)
1-5 Feb		Unit 1 HW	Unit 1 practice	Quiz 1: Unit 1	Unit 2 Vectors and two-dimensional kinematics (1.6-7, 3.1-2)
8-12 Feb		Unit 2 HW	Unit 2 practice	Quiz 2: Units 1-2	Unit 3 Relative and circular motion (3.1, 3)
15-19 Feb	*Force* Unit 4 Newton's Laws (4.1-5,7)	Units 3-4 HW	Units 3-4 practice	Quiz 3: Units 1-4	Unit 5 Forces and free-body diagrams (4.6,8, 5.3)
22-26 Feb		Unit 5 HW	Unit 5 practice	Quiz 4: Units 1-5	Unit 6 Friction (5.1)
1-5 Mar		Unit 6 HW	Unit 6 practice	Quiz 5: Units 1-6	*Energy* Unit 7 Work and kinetic energy (6.1-4, 11.2-3)
8-12 Mar	Unit 8 Conservative forces and potential energy (7.1-3, 11.2-3)	Units 7-8 HW	Units 7-8 practice	Quiz 6: Units 1-8	Unit 9 Work and potential energy I (7.1-3, 11.2-3)
15-19 Mar					

22-26 Mar		Unit 9 HW	Unit 9 practice	Quiz 7: Units 1-9	*Momentum* Unit 10 Center of mass (5.5, 6.5)
29 Mar-2 Apr	Unit 11 Conservation of momentum (8.1,3)	Units 10-11 HW	Units 10-11 practice	Quiz 8: Units 1-11	Unit 12 Elastic collisions (8.3-4)
5-9 Apr	Unit 13 Collisions, impulse, and reference frames (8.2-3)	Units 12-13 HW	Units 12-13 practice	Quiz 9: Units 1-13	*Rotation* Unit 14 Rotational kinematics and moment of inertia (9.1-3)
12-16 Apr	Unit 15 Parallel axis theorem and torque (9.3-4)	Units 14-15 HW	Units 14-15 practice	Quiz 10: Units 1-15	Unit 16 Rotational dynamics (9.4-6)
19-23 Apr		Unit 16 HW	Unit 16 practice	Quiz 11: Units 1-16	*Statics* Unit 17 Rotational statics (12.1-5)
26-30 Apr	Unit 18 Rotational statics II (12.1-5)	Units 17-18 HW	Units 17-18 practice	Quiz 12: Units 1-18	*Angular momentum* Unit 19 Angular momentum (10.1-3)
3-7 May	Unit 20 Angular momentum vector and precession (10.1-3)	Units 19-20 HW	Units 19-20 practice	Quiz 13: Units 1-20	*Oscillations* Unit 21 Simple harmonic motion (14.1-3)
10-14 May		Unit 21 HW			Final Exam: Units 1-21 (Date and time TBA; see BB announcements)