PHYS 121
Introductory Physics I
Dr. Eric C. Anderson
UMBC•Fall•2019
Syllabus

•Getting ready•

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

Workload•Experience shows that success requires at least 8-10 hours per week of intensive effort outside of class - more for those lacking strong preparation and study techniques. Be sure that you can dedicate the time and concentration required for success.

Blackboard (BB)•For access to course materials, discussion forums, your grades, helpful advice, and announcements. Log in at least once between classes.

The book and other required items•

1. Principal source: *FlipItPhysics* by Gary Gladding et al, ISBN: 9781429272438. Course access key: 17bfb301. You should have received a payment code by email. To enroll click *Start here!/FlipIt Physics* In BB. Supplemental source: *Physics for Scientists and Engineers* by Tipler. To access click *Start here!*/*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 click on *Start here!/CMI* in BB**.)**
2. RF LCD Clicker + Turning Account (from the bookstore). To register your clicker click *Start here!*/*Registering your clicker* in BB.
3. Scientific calculator. For use in discussion and exams.

Lecture and discussion•Check your schedule for lecture and weekly discussion meeting.

Section	Day and time	Room
PHYS 121-01 (lecture)	**MWF 9-9:50 AM**	**Meyr 030**
02(1505)	W 4:30-6:20 PM	ILSB 230
03(1506)	Th 8-9:50 AM	ILSB 230
04(1507)	Th 11:30 AM-1:20 PM	ILSB 201
05(1508)	Th 2:30-4:20 PM	ILSB 230
06(1509)	W 6:30 -8:20 PM	ILSB 230
07(1510)	W 1-2:50 PM	ILSB 230
08(6247)	Th 8-9:50 AM	ILSB 101
09(6246)	Th 5-6:50 PM	ILSB 101
PHYS 121-10 (lecture)	**MWF 11-11:50 AM**	**LH 1 101**
11(6249)	W 1-2:50 PM	ILSB 101
12(6250)	Th 11:30-1:20 PM	ILSB 230
13(6251)	Th 2:30-4:20 PM	ILSB 101
14(6252)	Th 7:30-9:20 PM	ILSB 201
15(7070)	W 6:30-8:20 PM	ILSB 201

•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

•Methods•

Prelectures and checkpoints•Access multimedia learning modules (MLMs) through the *FlipItPhysics* website, before most classes (see day-by-day guide sat the end of syllabus). Complete checkpoints – multiple-choice questions checking your understanding of the MLM content - no later than 10 minutes before class. Earn 80% of possible points for full credit.

Lecture•Course content is delivered via MLMs; lectures offer opportunities for you to deepen your conceptual understanding by working through questions posed by your instructor independently and with your peers. *I encourage you to sit with other members of your discussion group during lecture so that you can practice working together.* Find the pdf lecture outline the evening before each class on BB under *Course Documents*. ***Print it out and take notes or annotate it on your tablet****; otherwise you'll waste much of our time together writing down what's projected on the screen instead of thinking and discussing.*

Clickers• Bring your clicker to each class. You'll be awarded a point for each question that you respond to, not on whether or not you got it right.

Discussion•Part I: Warmup activity to be competed with the help of your group, addressing conceptual challenges and elements of problem solving. Part II: One or two big problems to be addressed by your group using the problem-solving framework presented in lecture. Grading is based both on completeness and accuracy.

Homework•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 4 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 a few days later for 80% credit. Practice using the problem-solving framework presented in lecture and discussion, and keep a careful written record of your work for future studying.

Exams•6 class exams and a comprehensive final. Needed quantitative relationships will be provided (see BB/*Course Materials*). Calculator allowed.

Part I (individual, 85%): Expect multiple-choice and short free-response items, some qualitative and some quantitative, and one big problem to be addressed using the problem-solving framework presented in lecture and practiced in discussion. *Given at 8 AM, in multiple lecture halls; check BB for your assigned lecture hall and seat.*

Part II (group, 15%): One big problem to be addressed using the problem-solving framework presented in lecture and practiced in discussion. *Given the same day in your usual lecture hall at your usual lecture time.*

Comprehensive final is individual only.

•Policies•

Grading•5% for prelectures/checkpoints, 7.5% for homework, 7.5% for best 11 of 13 discussion grades, 5% for clickers, 10% for each of 6 exams, 15% 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 materials are returned to you in discussion. Exam solutions are posted in BB/*Course Documents* at 5 PM after each exam. Please review graded work right away, and check that we enter your grades in BB 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 scheme revealed therein, and that your note explicitly addresses the discrepancy. Your entire exam will be regraded.)

Making up work•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. At my discretion, I'll request written verification of the cause of your absence and arrange a makeup over the same material. The final exam must be taken at the scheduled time No discussion makeups; we drop grades to allow for illness and other difficulties. No late prelectures/checkpoints; get an early start in case of technical or other difficulties. FlipItPhysics homework may be completed up to a week late for 80% credit. Your clicker grade allows 5 free days to account for absences for any reason and clicker malfunctions; no individual accommodations are possible.

Academic integrity•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.)

Courtesy•Electronic devices in class only to assist with learning physics please (e.g., viewing/annotating class materials)

•Getting help•

Contact me•Eric C. Anderson, Physics 320. Office hours MT 12:00-1:00 PM, Th 1:30-2:30 in Phys 226A through 10 Dec. (Check BB for updates.) Phone 455-5823, email andersoe@umbc.edu. Please email me through BB or use your UMBC email and give your full name and your class. *If you seek HW help or have a general course question, please post to the appropriate discussion forum on Blackboard, so that others might benefit*.

Try the BB discussion board•Post a question to a forum on Blackboard, or post an answer to another's question.

Form or join a study group•Perhaps with the help of the *Forming study groups* forum on BB.

Attend Supplemental Instruction/Peer assisted study sessions (SI/PASS)•A successful peer from last semester leads weekly study sessions and exam reviews; more info to follow on BB.

Drop by the Physics Tutorial Center•Physics 226, open 12-5 Monday through Thursday. Staffed by instructors and graduate TAs.

Attend the exam workshops•Practice exam-style questions and problems with your peers. Offered Wednesdays 12-12:50 PM in ILSB 101 before each class exam (see day-by-day guide below).

Contact the Learning Resource Center (LRC)•

1. Appointment Tutoring: free tutoring, by appointment, for selected classes, in small groups. Tutoring sessions take place in the Academic Success Center (Sherman Hall 345).To find a tutor visit https://lrc.umbc.edu/tutor/appointments/. Students can make an appointment as needed, or schedule weekly appointments.

2. Math and Science Tutoring Center: free tutoring for Math, Statistics, Science, and Economics classes. No appointment needed. The Math and Science Tutoring Center is located on the first floor of the A.O.K. Library, behind the reference desk. To check the schedule of available tutors visit https://lrc.umbc.edu/tutor/math-lab/ Students drop in and stay as long as they like, working independently and in study groups. Tutors work with students for 15 minutes and circle back to check in.

Who are peer tutors? Peer tutors are currently enrolled students with demonstrated course mastery who receive ongoing training. Peer tutors have undergone a selection process that includes faculty recommendations.

What happens during a tutoring session? Peer tutors help students learn course concepts and methods of analysis, practice problems, and prepare for tests; they also help with learning strategies and study skills for the classes they support.

Technology Support Center•Offers help with technical concerns with clickers, etc. https://doit.umbc.edu/tsc/

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 at sds.umbc.edu for registration information and to begin the process, or alternatively you may visit the SDS office in person in the Math/Psychology Building, Room 212. For any questions or concerns, you may contact us through email at disAbility@umbc.edu or phone at (410) 455-2459. If you require accommodations for this class, please visit me during office hours to discuss your SDS-approved accommodations.

•Day-by-day guide•

FlipIt Physics prelecture/checkpoints. FlipIt Physics Homework (HW). Exam. Supplemental source: (Tipler)

Week of:	Monday	Wednesday	Discussion	Friday
28 Aug-1 Sep		Unit 1 One-dimensional kinematics (1.3-4, 2.1-4)	No Meetings	Unit 1 (continued)
2-6 Sep	Unit 1 HW due Tues midnight	Unit 2 Vectors and two-dimensional kinematics (1.6-7, 3.1-2) Unit 2 HW due Thur midnight	Projectile motion	Unit 3 Relative and circular motion (3.1, 3)
9-13 Sep	Unit 3 (continued) Unit 3 HW due Tues midnight	Unit 4 Newton's Laws (4.1-5,7) Exam 1 workshop 12-12:50 PM ILSB 101	Relative and circular motion	Exam 1: Motion
16-20 Sep	Unit 5 Forces and free-body diagrams (4.6,8, 5.3) Unit 4 HW due Tues midnight	Unit 5 (continued) Unit 5 HW due Thur midnight	Newton's laws	Unit 6 Friction (5.1)
23-27 Sep	Unit 6 (continued) Unit 6 HW due Tues midnight	Unit 7 Work and kinetic energy (6.1-4, 11.2-3) Exam 2 workshop 12-12:50 PM ILSB 101	Friction	Exam 2: Force
30 Sep-4 Oct	Unit 8 Conservative forces and potential energy (7.1-3, 11.2-3) Unit 7 HW due Tues midnight	Unit 8 (continued) Unit 8 HW due Thur midnight	Conservation of energy I	Unit 9 Work and potential energy II (7.1-3, 11.2-3)
7-11 Oct	Unit 9 (continued) Unit 9 HW due Tues midnight	Unit 10 Center of mass (5.5, 6.5) Exam 3 workshop 12-12:50 PM ILSB 101	Conservation of energy II	Exam 3: Energy
14-18 Oct	Unit 11 Conservation of momentum (8.1,3) Unit 10 HW due Tues midnight	Unit 12 Elastic collisions (8.3-4) Unit 11 HW due Thur midnight	Conservation of momentum I	Unit 13 Collisions, impulse, and reference frames (8.2-3)
21-25 Oct	Unit 13 (continued) Units 12-13 HW due Tues midnight	Unit 14 Rotational kinematics and moment of inertia (9.1-3) Exam 4 workshop 12-12:50 PM ILSB 101	Conservation of momentum II	Exam 4: Momentum

28 Oct-1 Nov	Unit 15 Parallel axis theorem and torque (9.3-4) Unit 14 HW due Tues midnight	Unit 15 (continued) Unit 15 HW due Thur midnight	Rotational kinematics and torque	Unit 16 Rotational dynamics (9.4-6)
4-8 Nov	Unit 16 (continued) Unit 16 HW due Tues midnight	Unit 17 Rotational statics (12.1-5) Exam 5 workshop 12-12:50 PM ILSB 101	Rotational dynamics	Exam 5: Rotation
11-15 Nov	Unit 18 Rotational statics II (12.1-5) Unit 17 HW due Tues midnight	Unit 19 Angular momentum (10.1-3) Unit 18 HW due Thur midnight	Statics	Unit 20 Angular momentum vector and precession (10.1-3)
18-22 Nov	Unit 20 (continued) Units 19-20 HW due Tues midnight	Unit 21 Simple harmonic motion (14.1-3) Exam 6 workshop 12-12:50 PM ILSB 101	Angular momentum	Exam 6: Statics and angular momentum
25-29 Nov	Unit 22 Simple and physical pendula (14.3) Unit 21 HW due Tues midnight	Unit 22 (continued)		
2-6 Dec	Unit 23 Fluid statics (13.1-3) Unit 22 HW due Tues midnight	Unit 24 Fluid dynamics (13.4) Unit 23 HW due Thur midnight	Fluids	Unit 24 (continued)
9-13 Dec	Unit 24 (continued) Unit 24 HW due Tues midnight			
	TUESDAY 17 DEC 6-8 PM. Final exam (First half: Oscillations and fluids, Second half: comprehensive)			