## CCBC Spring 2022 SoMS – Physical Science General Physics I - PHYS 151

## CH1-20228

### Contents

| A. | Basic Course Information | . 1 |
|----|--------------------------|-----|
| В. | Course Goals Overall     | .2  |
| C. | Evaluation               | .5  |
| D. | Course Procedures        | .6  |

**General Physics I** serves as the first course in a set of three calculus-based courses in the basic principles of physics for students majoring in engineering, mathematics, or a physical science. The course includes Newtonian mechanics, kinematics and dynamics of translational, rotational, and simple harmonic motions, momentum, energy, and gravitation.

4 Credits: 3 lecture hours; 3 laboratory hours

Prerequisites: MATH 251 with a C or better and (PHYS 101 or Science Coördinator's permission).

# NOTE: You are expected to know the material from your completed prerequisite courses so that you can use those skills in PHYS 151. Prerequisites are not just a box to be checked off.

#### A. Basic Course Information

- 1. Instructor: Dr Dave Baum
- Contact information: Catonsville MASH 016 (443) 840 4341 -DBAUM@CCBCMD.EDU (preferred means) – Course Webpage: <u>https://cwoer.ccbcmd.edu/science/physics/Baum/PHYS151S22/PHYS151S22.htm</u>.
- 3. Office Hours: MWF 11:15-12:15 & TR 1:00 2:00 p.m. and by appointment.
- Contact Turn-around Time: I expect to get back to your eMail inquiries within two work days. Phone messages may take up to a week. I do not respond to messages in BrightSpace.
- 5. Catonsville Physical Science Dept: 443-840-4560.
- Class Times, Days, and Locations: MW 12:20 3:35 COMBINED LECTURE/LAB in C-MASH 038.

- 7. This is a four credit hour course. For each credit hour, the student is expected to complete at least two hours of work per week outside of the class, including doing homework and practice problem solving, reading, writing laboratory reports, and preparing for exams. Note that these are minimal requirements for any course and that many students require more time than this for science courses.Statement of student out-of-class work expectations
- 8. Required Materials:
  - a) For laboratory courses, appropriate clothing (including shoes that cover the tops of the feet and have good traction) is required. See "Course Procedures" for more information. In addition, you must come with a mask; additional required PPE will be provided by the College.
  - b) Ling, Sanny, and Moebs, <u>University Physics Vol 1</u>, Openstax. The bookstore will sell you a hardbound copy, or you can download a free copy from: <u>https://openstax.org/details/books/university-physics-volume-1</u>.
  - c) The Laboratory Manual is available at the Bookstore.
  - d) A lab notebook (for example, Ampad #26-251, or any quad-ruled 5 to 1" bound composition book) available from almost any bookstore for about \$1. Do not buy the more expensive lab notebooks you may find.
  - e) A cheap scientific calculator that can do trig functions, scientific notation, and natural exponents/logs (about \$10). An \$80 programmable graphing calculator is not necessary. Cell phone calculators are not allowed during exams.
  - Optional Materials:
    - f) The textbook study materials, available at <u>https://openstax.org/details/books/university-physics-volume-</u> <u>1?Student%20resources</u>.
    - g) A pair of safety glasses may be needed for some labs. Some common-use goggles will be made available.
    - h) It is also recommended that you purchase a regular lined composition book in which to write practice problems.
- 9. Additional basic information
  - a) You may be asked to complete a number of surveys during the semester in addition to the usual course evaluations.
  - b) The College requires you to check your College eMail for important messages. Federal regulations require that we must fully determine the identity of the emailing party, and further require that we disclose student information to only the student. In order to meet these requirements for email communication, only emails received from the student's CCBC email account will get a response. Be sure to send ALL email with your CCBC email account to avoid delays in communicating with your instructor.

#### B. Course Goals Overall

1. Course objectives: Upon completion of this course, the student will be able to:

a) solve problems analyzing uniformly accelerated motion;

- b) perform vector addition by the graphical and component methods;
- c) apply Newton's Laws of Motion to problems involving force analysis;
- d) develop models from the Force Laws for Work and Energy, Impulse and Momentum;
- e) analyze circular motion;
- f) apply Newton's Law of Universal Gravitation;
- g) apply the principle of Conservation of Mechanical Energy in solving problems;
- h) apply the principle of the Conservation of Linear Momentum in analyzing collisions;
- i) demonstrate that there are often several ways to model processes and behavior, explain the limitations of those models, and discuss the ethics of using and misusing models;
- j) analyze rotational motion;
- k) apply force and torque analysis to static systems;
- I) analyze simple harmonic motion;
- m) perform a collaborative laboratory investigation;
- n) use computer-based data collection methods;
- o) plot and analyze data using Excel;
- evaluate the results of experiments in terms of supporting or disproving theoretical concepts;
- q) search for and find pertinent and reliable information, such as the accepted values of measured quantities or useful physical relationships not discussed in class by using appropriate technology or other more traditional reference sources;
- r) write, using MS Word and Excel, coherent laboratory reports that follow the required format;
- s) properly acknowledge reference sources and others' contributions to collaborative work; and
- t) discuss the universal applicability of the laws of physics, making them the intellectual property of all cultures and segments of humankind.
- 2. Major topics:
  - a) Introduction
    - i. Standards of length, mass, and time
    - ii. Dimensional analysis
    - iii. Problem solving strategies
  - b) Motion in One Dimension
    - i. Linear displacement
    - ii. Velocity
    - iii. Acceleration
    - iv. Freely falling objects
  - c) Vectors
    - i. Vectors and their properties

- ii. Displacement, velocity, and acceleration in two dimensions
- iii. Motion in two dimensions
- d) Laws of Motion
  - i. Newton's first law
  - ii. Newton's second law
  - iii. Newton's third law
  - iv. Frictional forces
- e) Energy
  - i. Work
  - ii. Kinetic and gravitational potential energy
  - iii. Spring potential energy
  - iv. Conservative and non-conservative forces
- f) Momentum and collisions
  - i. Momentum and impulse
  - ii. Conservation of momentum
  - iii. Collisions
- g) Rotational Motion
  - i. Rotatinal kinematics
  - ii. Angular speed and angular acceleration
  - iii. Relations between angular and linear quantities
- h) Law of Gravitation
  - i. Newtonian gravitation
  - ii. Kepler's laws
- i) Rotational Dynamics
  - i. Torque and equilibrium
  - ii. Torque and angular acceleration
  - iii. Angular momentum
- j) Equilibrium of rigid bodies
- k) Oscillations and Mechanical Waves
  - i. Simple harmonic motion
  - ii. Waves: frequency, amplitude, and wavelength
  - iii. Sound and hearing
- 3. Rationale

This course is part of a three semester sequence. Although it will provide you with some specific knowledge and skills that will be useful to you in your future studies, it is also a vehicle to help you acquire the ability to construct arguments using a logical progression of steps from premise to conclusion and an exercise in clear and concise expression. In addition, this course demonstrates that there are often several ways to model processes and behavior and provides practice in constructing models and realizing the limitation of those models. It is an opportunity to develop the ability to extrapolate and apply current knowledge to new situations.

#### C. Evaluation

- 1. Requirements:
  - a) The four highest scores of the five exams constitute 64% of your final grade; that is to say that your lowest exam grade will be ignored. There will be NO make-up exams; a missed exam will be given a grade of zero, which will then be dropped as your lowest grade. Situations involving two, excusable, missed exams shall be treated on an individual basis. Your fifth regular exam will occur on final day. Exams may cover any material presented in class or in the textbook, unless a section is specifically omitted. A relationship sheet will be provided for your use. Questions on the grading of an exam must be brought to my attention within a week of the exam's return. You may be asked to present a photo ID at each exam. Seating during exams may be assigned.
  - b) Homework assignments, in-class quizes, and special projects will total 11%. Expect that an assignment will be due at the beginning of every class day; if the assignment is not announced at the end of class, check your e-mail later in the day. Not all assigned problems will be graded. No late homework will be accepted, but some number of homework grades will be dropped in the same manner as for exams. Answers to all assigned problems will be made available for your inspection. Homework will be submitted through Brightspace and must be in pdf form. Contact me if you have questions about creating a pdf.
  - c) Laboratory work counts 25%. A maximum of two missed laboratories can be made up *per* the procedures listed in the lab manual. Lab reports will be submitted through Brightspace and must be in pdf form. Contact me if you have questions about creating a pdf.
- 2. Grading policy:

Final grades will be calculated as follows:

- ≥ 90% A ≥ 80% B
- ≥ 60% C
- ≥ 50% D
- < 50% F

Please note that this system eliminates competition among students, so there is no reason not to help one another. Each student should keep a record of his grades. Students may request an estimated grade at any time.

Also, note that D is a passing grade, although a higher grade may be necessary to enter a given program or to continue with this sequence.

3. Attendance policy:

Attendance is not mandatory, but non-attendance will almost certainly affect how well you perform on assignments. Remember that no late homework assignments or missed exams will be made up, although, some number of homework assignments and your lowest exam grade will be dropped at the end of the semester, and two missed laboratory exercises may be made up near the end of the semester at a common time to be announced. The exception is if you decide to AUDIT the class, in which case attendance becomes mandatory.

4. Audit policy:

You can no longer wait until mid-semester to decide that auditing a course is appropriate; the final date to change to an audit now coincides with the final date for withdrawing with a 50% refund. Failure to participate in the class as an audit will result in a grade of " instead of AU. The last day to change to an 'audit' this semester is: February 18<sup>th</sup>, 2022.

#### **D.** Course Procedures

- 1. Course-related policies and procedures:
  - a) The class will follow any and all COVID related precautions required by the college. At this point, these include masks at all times, face shields during lab exercises, and cleaning tales both before and after class.
  - b) Attendance is not mandatory, but no late homework assignments or missed exams will be made up. *Exception: any student registered as an audit must attend regularly; failure to do so will result in a grade change to either W or whichever letter grade is appropriate for the completed work.*
  - c) You will be given a relationship sheet for each exam; a copy is available through the link on the course webpage. You may also find it helpful when doing your homework assignments. Please feel free to ask for additional relationships *during* the exams if you think you need them to complete a problem.
  - d) I have not made a detailed list of material to be covered in class, but it is my intention to cover at least Chapters 1 13 and 15-17.
  - e) Cheating policy: You are permitted, indeed, encouraged, to consult with classmates on labwork and homework. However, presenting another's work as your own is considered cheating. You should therefore always present material from a reference source in your own words and credit that source. Collaboration on exams is not allowed; no cell phone calculators are allowed during exams. Any cases of academic dishonesty will be dealt with according to College policies (see Office of Judicial Affairs: <a href="http://www.ccbcmd.edu/judicialaffairs/index.html">http://www.ccbcmd.edu/judicialaffairs/index.html</a>).

- f) In accordance with the Americans with Disabilities Act, CCBC is committed to providing equal access to educational opportunities for all students by arranging support services and reasonable accommodations for students with disabilities. A student with a disability may contact the appropriate campus office for an appointment to discuss reasonable accommodations. An appointment must be scheduled within a time period that allows staff adequate time to respond to the special needs of the student. The student must provide the appropriate office with proper documentation supporting the need for reasonable accommodations. Contact Beth Hunsinger in the Office of Disability Support Services at 443-840-1741. Once you are approved, notify me as soon as possible.
- g) There will be no cell phone activity during class. If you are expecting an important call, be sure your phone is on vibrate and take the call in the hall. There will be no cell phone activity at all during exams.
- h) A student may not leave the classroom during an exam for any reason. Leaving the classroom means that the exam has been submitted and the student will not be allowed to continue working on the exam upon return. Students should make sure to have all items needed to take the exam and take care of any personal business prior to class starting on exam days. If there is a medical reason why a student cannot sit for two hours, the student may contact the Office of Disability Support with proper documentation to obtain an accommodation letter. Accommodations are not retroactive.
- i) No food or drink is allowed in class. Closed-toed shoes are required to provide protection from broken glass, heavy objects, and other hazards. On occasion, safety glasses will be required during laboratory exercises. Failure to abide by this policy shall result in your removal from the classroom.
- j) This class cannot be recorded without my written permission. A request form is available.
- k) Anyone who is not officially registered for this class may not attend.
- For college-wide syllabus policies, such as the Code of Conduct for Academic Integrity, Grades and Grading (including FX and progress grades), and the Audit/Withdrawal policies, please go to the MySyllabiPolicies tab on the <u>myCCBC</u> page.
- 3. To access information about student services, such as Academic Advising, College and Community Outreach/Success Navigators, and Disability Support Services, students may refer to the Student Support Services link on the <u>CCBC catalog home page</u>.
- 4. Contact information for course-related concerns: Students should first attempt to take concerns to the faculty member. If you are unable to resolve course-related concerns with the instructor, you should contact Dr Erica L. DiCara, Catonsville Physical Science Coördinator, at edicara@ccbcmd.edu, or at (443) 840-4119.

5. Course calendar/schedule

January  $30^{th}$  – Drop with 100% Refund Deadline January  $31^{st}$  – Classes Start February  $16^{th}$  – EXAM I February  $18^{th}$  –50% Refund Deadline – Audit Deadline March  $9^{th}$  – EXAM II March  $15^{th}$  –December Graduation Application deadline March  $30^{th}$  – EXAM III April  $9^{th}$  –  $18^{th}$  – No Classes April  $20^{th}$  –Withdrawal Deadline May  $2^{nd}$  – EXAM III May  $16^{th}$  – Last Day of Classes May  $18^{th}$  – Optional Q Session (2-4) May  $20^{th}$  – EXAM V (12-2) October  $7^{th}$  - Incomplete Makeup Deadline

6. Material in BlackBoard will be available until September 1<sup>st</sup>.

This syllabus may be changed with notification to the class.

List of Full URLs used in this document:

CCBC Catalog: <u>http://catalog.ccbcmd.edu/index.php</u>

myCCBC page: https://myccbc.ccbcmd.edu/

Office of Judicial Affairs: http://www.ccbcmd.edu/judicialaffairs/index.html

Course Webpage: http://faculty.ccbcmd.edu/~dbaum/PHYS151S22/PHYS151S22.htm

Textbook: <a href="https://openstax.org/details/books/university-physics-volume-1">https://openstax.org/details/books/university-physics-volume-1</a>

Ancilliary materials: <u>https://openstax.org/details/books/university-physics-volume-1?Student%20resources</u>