PHY-251: UNIVERSITY PHYSICS I
COURSE SYLLABUS – FALL 2021

Instructor:	Matthew Cochran
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Course Time:	Monday, Wednesday, and Friday from 8:30 to 9:20. Thursday from 5:30 to 6:20.
Course Room:	Henry Hall Room 223
Prerequisites:	MA-210. Concurrent enrollment in PHY-251L is assumed.
Text:	R. Knight, *Physics for Scientists and Engineers* 4th ed., Pearson, New York, 2017. ISBN-10: 0321844351, ISBN-13: 978-0321844354 (The 3rd ed is fine too.)
Other Materials:	Scientific calculator

COURSE DESCRIPTION:
This course is the first part of a year-long introductory physics sequence focusing on the application of physical principles, logical reasoning, and mathematical analysis needed to understand a broad range of natural phenomena. Topics include classical mechanics, fluid dynamics, and thermodynamics.

EVALUATIONS AND GRADING SCALE:

Exam 1	20%
Exam 2	20%
Exam 3	20%
Homework and Quizzes	20%
Exam 4	20%

90%	–	100%	A
80%	–	90%	B
70%	–	80%	C
60%	–	70%	D
0%	–	60%	F

Incomplete grades (I) will be given in accordance with college regulations as outlined in the college catalog. Withdrawals (W) from the class are the responsibility of the student and deadlines are set by the college.

EXAMS:
There will be four examinations as part of the requirements for the course. The exams will be, by necessity, cumulative. Physics is sequential and its concepts must be learned in order. Material for exams will be drawn primarily from homework problems. Hence, the best way to review for an exam is to review homework assignments.

Make-up exams will only be given under extenuating circumstances beyond the student's control. Persons missing an exam due to illness or injury must present a doctor's certificate. Make-up exams must be completed within one week of the scheduled exam date or on the day the student returns to school (whichever comes first). Scheduling is the responsibility of the student.

HOMEWORK AND QUIZZES:
To be successful in this course, it is essential that you complete all homework assignments. Be prepared to spend three hours or more on homework every week. If you are having trouble, get help from the instructor or your classmates. Do not fall behind. Homework is due at the beginning of class. Late homework is not accepted.

A ten-minute quiz will be given most weeks. Material for the quizzes will be drawn from material covered during the previous week. Quizzes may be given at the beginning of class, so arrive on time. Make-up quizzes are not given.

ATTENDANCE:
Regular attendance is expected of all students. Read material prior to lecture. If a topic is still not clear after it has been discussed in class, ask questions. Time will be spent working through homework problems and reviewing for exams in addition to lecturing. You will work with partners in class. It is important that partners engage in discussion of their work and avoid working as isolated individuals.

STUDENT LEARNING OUTCOMES:
Upon successful completion of the course, students will demonstrate:

1. The ability to apply quantitative reasoning and appropriate mathematics to describe or explain phenomena in the natural world;
2. The ability to interpret multiple scientific representations (e.g., verbal descriptions, diagrams, graphs, and formulas) and translate between them;
3. An understanding of mechanics (e.g., translational motion, forces and equilibrium, work, energy, and momentum);
4. An understanding of the principles of thermodynamics and fluids;
5. The ability to apply physics principles to understand humans, living systems, and scientific instrumentation.

PROGRAM LEARNING OUTCOMES
Students completing a minor in physics will be able to:

1. Apply quantitative reasoning and appropriate mathematics to describe phenomena in the natural world.
2. Interpret multiple scientific representations, including verbal descriptions, diagrams, graphs, formulas, and translate between them.
3. Apply physics principles to understand living systems, scientific instrumentation, and everyday experiences.

MARIANIST VALUES:
The Natural Sciences Division provides an *integral, quality education:* sophisticated integrative course content taught by experienced, dedicated, and well-educated instructors.

- We *educate in family spirit* – every classroom is an Ohana and you can expect to be respected yet challenged in an environment that is supportive, inclusively by instructors who take the time to personally get to know and care for you.
- We e*ducate for service, justice and peace,* since many of the most pressing global issues (climate change, health inequity, poverty, justice) are those which science and technology investigate, establish ethical parameters for, and offer solutions to.
- We *educate for adaptation and change.* In science and technology, the only constant is change. Data, techniques, technologies, questions, interpretations and ethical landscapes are constantly evolving, and we teach students to thrive on this dynamic uncertainty.

The study of science and technology can be formative, exploring human creativity and potential in the development of technologies and scientific solutions, the opportunity to engage in the stewardship of the natural world, and the opportunity to promote social justice. We provide opportunities to engage with the problems that face Hawai‘i and the Pacific region through the Natural Sciences curriculum, in particular, those centered around severe challenges in health, poverty, environmental resilience, and erosion of traditional culture. The Marianist Educational Values relate to Native Hawaiian ideas of *mana, na'auao, ohana,* aloha and aina. We intend for our Natural Sciences programs to be culturally-sustaining, rooted in our Hawaiian place, and centered on core values of *Maiau*, be neat, prepared, careful in all we do; *Makawalu,* demonstrate foresight and planning; *`Ai,* sustain mind and body; *Pa`a Na`au,* learn deeply.

TITLE IX COMPLIANCE:
Chaminade University of Honolulu recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated at CUH. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. If you or someone you know has been harassed or assaulted, you can find the appropriate resources by visiting Campus Ministry, the Dean of Students Office, the Counseling Center, or the Office for Compliance and Personnel Services.

DISABILITY ACCESS:
If you need individual accommodations to meet course outcomes because of a documented disability, please speak with me to discuss your needs as soon as possible so that we can ensure your full participation in class and fair assessment of your work. Students with special needs who meet criteria for the Americans with Disabilities Act (ADA) provisions must provide written documentation of the need for accommodations from the Counseling Center by the end of week three of the class, in order for instructors to plan accordingly. If a student would like to determine if they meet the criteria for accommodations, they should contact the Counseling Center at (808) 735-4845 for further information (counselingcenter@chaminade.edu).

MUSIC DEVICES AND MOBILE PHONES:
Unless specifically permitted by your instructor, use of music devices and mobile phones is prohibited during all Natural Science and Mathematics classes at Chaminade, as it is discourteous and may lead to suspicion of academic misconduct. Students unable to comply will be asked to leave class.

WEEKLY SCHEDULE:

Week	Date	L#	Topic	Reading	Due
1	Aug 23	1	Course intro		
	Aug 25	2	Motion diagrams	1.1 to 1.4	
	Aug 26	3	Position; Velocity	1.1 to 1.4	
	Aug 27	4	Acceleration; Units	1.5 to 1.8	
2	Aug 30	5	Velocity in 1D; **Q1**	2.1 to 2.3	**HW1**
	Sep 01	6	Acceleration in 1D	2.4	
	Sep 02	7	Free fall; Inclined plane	2.5 & 2.6	
	Sep 03	8	Vectors; Trig review	3.1 to 3.4	
3	Sep 06	**H1**	**Labor Day – No Class**		
	Sep 08	9	Vectors; Trig review; **Q2**	3.1 to 3.4	**HW2**
	Sep 09	10	Motion in two dimensions	4.1	
	Sep 10	11	Projectile motion	4.2	
4	Sep 13	12	Circular motion; **Q3**	4.5 & 4.6	**HW3**
	Sep 15	13	Forces and Newton's laws	5.1 to 5.6	
	Sep 16	14	Review		
	Sep 17	**E1**	**EXAM 1 – Chapters 1 to 4**		
5	Sep 20	15	Free body diagrams	5.7	
	Sep 22	16	Statics	6.1	
	Sep 23	17	Mass and weight	6.2 & 6.3	
	Sep 24	18	Friction and drag	6.4 & 6.5	
6	Sep 27	19	Second law examples; **Q4**	6.6	**HW4**
	Sep 29	20	Newton's third law	7.1 to 7.3	
	Sep 30	21	Ropes and Pulleys	7.4	
	Oct 01	22	Dynamics in two dimensions	8.1 & 8.2	

WEEKLY SCHEDULE:

Week	Date	L#	Topic	Reading	Due
7	Oct 04	23	Energy; Work; **Q5**	9.1 to 9.3	**HW5**
	Oct 06	24	Work done by a spring	9.4	
	Oct 07	25	Thermal energy; Power	9.5 & 9.6	
	Oct 08	26	Potential energy; **Q6**	10.1 to 10.3	
8	Oct 11	**H2**	**Discoverers' Day – No Class**		
	Oct 13	27	Conservation of energy	10.4 & 10.5	**HW6**
	Oct 14	28	Review		
	Oct 15	**E2**	**EXAM 2 – Chapters 5 to 9**		
9	Oct 18	29	Impulse and momentum	11.1	
	Oct 20	30	Conservation of momentum	11.2 to 11.4	
	Oct 21	31	Explosions; Momentum in 2D	11.5 & 11.6	
	Oct 22	32	Torque	12.5	
10	Oct 25	33	Torque and statics; **Q7**	12.8	**HW7**
	Oct 27	34	Fluids; Pressure	14.1 & 14.2	
	Oct 28	35	Measuring pressure	14.3	
	Oct 29	36	Buoyancy	14.4	
11	Nov 01	37	Dynamics; **Q8**	14.5	**HW8**
	Nov 03	38	Moles	18.1 to 18.3	
	Nov 04	39	Temperature	18.1 to 18.3	
	Nov 05	40	Ideal gasses	18.4	
12	Nov 08	41	Ideal gas processes; **Q9**	18.5	**HW9**
	Nov 10	42	Energy and gasses	19.1	
	Nov 11	**H3**	**Veteran's Day**		
	Nov 12	**E3**	**EXAM 3 – Chapters 10, 11, 12, and 18**		
13	Nov 15	43	Work and gasses	19.2	
	Nov 17	44	Heat and the First Law of Thermodynamics	19.3 & 19.4	
	Nov 18	**H4**	**Thanksgiving Recess – No Class**		
	Nov 19				
14	Nov 22	45	Thermal properties of matter; **Q10**	19.5	**H10**
	Nov 24	46	Calorimetry	19.6	
	Nov 25	47	Specific heat of gasses	19.7	
	Nov 26	48	Molecular speed and collisions	20.1	
15	Nov 29	49	Pressure in a gas; **Q11**	20.2	**H11**
	Dec 01	50	Temperature	20.3	
	Dec 02	51	Thermal energy and specific heat	20.4	
	Dec 03	52	Review		
Finals	Thursday	**FE**	**FINAL 8:30 – 10:30**		