Course Information

Course Number:	ENGR/PHYS 216
Course Title:	Experimental Physics and Engineering Lab II: Mechanics
Section:	***445***
Time:	W 12:40 pm – 1:30 pm, F 12:10 pm – 3:00 pm
Location:	ZACH 248, ZACH 398B
Credit Hours:	2

Instructor Details

Instructor:	Johnathan McKenzie, PhD
Office:	ZACH 424-C
E-Mail:	johnathan.mckenzie@tamu.edu
Office Hours:	M 9:00 am – 11:00 am, R 1:45 pm – 2:45 pm, or by appointment

Course Description

Description and application of laws of physical motion to the solution of science and engineering problems; using sensing, control and actuation for experimental verification of physics concepts while solving engineering problems.

Course Prerequisites

Grade of C or better in MATH 151 or MATH 171 or equivalent; grade of C or better in ENGR 102; grade of C or better and concurrent enrollment in PHYS 206.

Special Course Designation

NA

Course Expectations

You are expected to:

- **Always use your @tamu.edu e-mail account to send correspondence between yourself and the teaching team. Always include your section number in the subject line for all correspondence. Check your @tamu.edu email account daily.**
- Use your Canvas account (http://canvas.tamu.edu/) to access course information, assignments, and your grades.
- Be an active problem solver, contributor, and discussant in lecture and lab.
- Be prepared and accountable for both lecture and lab by reading the assigned material ahead of time and be able to answer simple questions over said material.
- Be held accountable for all assigned material that is, or is not, explicitly discussed in class.
- Have a public presence in the class. This can be accomplished by asking/answering questions.
- Attend class as a community expectation, including arriving on time and staying until class is over.
- Act as a professional.

Course Learning Outcomes

The second laboratory course in the freshman sequence focuses on the description and application of the laws of physical motion to the solution of science and engineering problems. During bi-weekly projects students are introduced to a variety of sensors, their basic calibration, and will program the computer-based data-acquisition and control framework. Using sensing, control and actuation these lab projects target experimental verification of the physics concepts while solving direct engineering problems.

Conceptual Knowledge to Gain:

- Understanding the role of the physical laws of motion, static and dynamical Newtonian mechanics to engineering applications.
- Usage of sensors, data-acquisition frameworks, and logic programming to solve specific engineering applications.

Mode of Instruction:

There are 6 labs and 14 lectures in this course.

- Lectures meet in person for one hour per week.
- Labs meet in the Engineering Foundations Lab (ZACH 398) at their assigned time.

Lectures will cover topics including (but not restricted to) material needed for understanding the labs, applications of mechanics to engineering topics, engineering ethics, and art in engineering.

The lab component of the course is at its core composed of a set of mostly biweekly units – each lab is allocated two weeks. Each unit targets different engineering application of physics concepts.

Textbook and/or Resource Materials

Lab Manual: ENGR 216/PHYS 216 Lab Handouts. All lab handouts (instructions, etc.) will be available on the course Canvas site. (There is no separate text for you to buy.)

You will also need the PHYS 206 textbook - University Physics, vol. 1, 15th edition, by Young; ISBN: 978-0137638468. Since this is a required book for PHYS 206, you should have purchased it for that course. (If you are satisfying the PHYS 206 requirement with a different PHYS course, any text which covers mechanics will be fine.)

Students are required to have a laptop computer that meets the specifications of the College of Engineering (see BYOD specifications). If your laptop does not have an RJ45 Ethernet port, you will have to purchase a USB-to-RJ45 adapter. Students are required to have a smartphone or web cam for test proctoring.

It is strongly recommended that you use your TAMU Google Drive for teamwork. You will need access to the YouTube channel associated with your TAMU Google account. Instructions on how to set this up will be provided on Canvas.

Grading Policy

- Lab assignments (50%) – There are 6 lab assignments over the course of the term. Lab reports are graded out of 100 points.
- Homework (10%) – There will be homework associated with the 14 lectures in the course.
- Class activities (17%) – There will be weekly activities assigned during lecture.
- Industry Night and Department Information Saturday (3%) – You will be required to attend 1 Industry Night Seminar during the term. **You will be required to attend 2 Department Information Presentations on Saturday, March 4th.** For all of these events you will need to submit a short (250 word) essay indicated you attended and paid attention. More details on Industry Nights and DI Saturday will be forthcoming on Canvas.
- Final Exam (20%) – There will be a final exam on the material presented in the lectures during the finals period.

The following grading scale will be used to determine your semester course grade:

$$100 \geq A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$$

Other Pertinent Course Information

Computer Languages:

Work in this course will build on your knowledge of Python 3 gained in ENGR 102. You will be expected to write/modify Python scripts to acquire and analyze data using both your own computer and the lab computer. The lab computer uses the Linux operating system, and basic instruction on this OS will be provided.

Lab Safety:

IMPORTANT For your safety and the safety of other people in the laboratory, the following rules must be followed:

1. Long pants and closed-toe shoes must be worn at all times.
2. No loose clothing or loose jewelry should be worn. Long hair should be tied back. (This is to avoid potential entanglement with the moving parts of the air table.)
3. Pay attention to the amperage and voltage limits listed in the labs when using electronic equipment. (This is to avoid potential shock-hazards.)

You will not be allowed in the lab if you do not follow these rules.

Lab Performance and Submission Rules:

Please read the following information carefully.

- You should prepare for the lab ahead of entering the lab – read the lab instructions ahead of time.
- Labs are done, and lab reports are submitted, in teams of three (3) or four (4) people. The number of people in your group depends on the number of people enrolled in your section.
- You will be randomly assigned to a lab group in your section. Lab groups may rotate and you may check your assigned group in the multisection. Lab groups may be changed by Dr. Cahill or Dr. Eusebi.

- If people are missing from lab groups on the day of lab (due to illness, sports, interviews, etc.) your Peer Teachers may rearrange lab groups within a section for that lab only. Do not work with people outside your lab group without prior approval of the Peer Teacher. If you do so, it will be very difficult for the Peer Teacher to give you credit for the lab report, and you may end up with a zero.
- While any individual lab takes place over two weeks in ZACH 398, you are assigned a specific week in which you can do the lab. Pay attention to your assigned week. You cannot do the lab if it is not your week.
- Lab reports are a team submission – each team member should contribute in some manner. Failure to contribute to the team work on a lab and lab report can result in a reduced individual grade for the lab report.
- Lab reports are due one week after the last possible day to perform a lab. Labs will be submitted through the Canvas multisection site, and due dates will be posted there.
- Labs which are late receive a deduction of 0.5% per hour from their grade – i.e. if you turn your lab in 1 hour late, your lose 0.5 points out of 100 for that lab, if you turn it in 12 hours late you lose 6 points out of 100 for that lab, etc. However, labs will not be accepted past 3 days after their due date. Submission times and deductions are automatically applied by Canvas.

Lab Schedule:

Each section has its own schedule of dates when it has access to the lab. Please check the table below to see when you do lab. (Please check your schedule on Howdy to make sure you know what section you are in.) Lab 6 is done using online materials, so you do not attend the lab in person. The online material will be made available 4/10.

Section	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6
445	1/27	2/10	2/24	3/10	3/31	4/10

Lab Make-Ups:

If you miss your assigned lab period, you will have to do a make-up lab for credit.

- In order to do this, you will need to submit a make-up lab request on the Canvas multisection. Your request will only be approved if you have a valid excuse. Valid reasons include medical excuses and university-excused absences. Invalid reasons include activities such as the need to leave town early for social events.
- You will have to use a video demonstration and online data set to write your lab report. This report will be an individual submission.
- Due dates for make-up labs will follow the same rule as due dates for normal labs – you have one week after you do it to turn in the report. (This will have to be determined on a case-by-case basis, since it is possible to a student to be sick for an extended duration.)

Lecture Homeworks:

- Sections may assign common (multi-section) or section-specific homework.
- Homework assignments and solutions should be done individually unless otherwise directed.

Lecture Late Work Policy:

Dr. McKenzie accepts homework and class activities up to one week late, with a penalty of 0.5% per hour. Resubmissions after a grade has been assigned are not accepted.

Lecture Makeup Work Policy:

Class work missed due to an excused absence must be made up (or scheduled to make up) within one week of returning to class. Those without an excused absence may request to make up work before missing class. Work missed without an excused absence that did not notify Dr. McKenzie before missing class cannot be made up.

Course Schedule

Lecture Date	Lecture Topic	Lab Date	Lab Topic
1/18	Introduction, Measurement error	1/20	No lab
1/25	Propagation of error	1/27	*Lab 1: Error analysis and orientation*
2/1	Finite differences	2/3	No lab
2/8	Basic experimental statistics	2/10	*Lab 2: Visual odometry*
2/15	Confidence intervals	2/17	No lab
2/22	Universal accounting equation	2/24	*Lab 3: Force evaluation*
3/1	Particle statics	3/3	No lab
3/4 (Sat)	**DI Saturday**		
3/8	Conservation of momentum (collisions)	3/10	*Lab 4: Collisions*
3/13 – 3/17	**Spring Break**		
3/22	Rigid body statics	3/24	No lab
3/29	Angular momentum	3/31	*Lab 5: Rotational motion*
4/5	Harmonic motion	4/10	*Lab 6: Harmonic motion (online)*
4/12	Engineering ethics 1	4/14	No lab
4/19	Engineering ethics 2	4/21	No lab
4/26	Art in engineering	4/28	No lab

Important Dates:

January 17 – First day of spring semester classes
January 23– Last day (by 5 p.m.) for adding/dropping courses for the fall semester
March 6 – Mid-semester grades due
March 13 - 17 – Spring break
April 7 – Reading day, no classes
April 18 – Last day (by 5 p.m.) to drop courses with no penalty (Q-drop) or to officially withdraw from the University
May 2 – Redefined day, attend Friday classes, last day of classes
May 3 – Reading day, no classes
May 4 - 9 – Final exams

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

Uploading of homework assignments and answers to, or downloading of answers from any online "study site" such as, but not limited to, Chegg, Course Hero, Quizlet, etc. is strictly prohibited and will be treated as cheating.

You should not submit as your own work solutions produced by any paid tutoring service.

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

Classroom Access and Inclusion Statement

Texas A&M University is committed to engaged student participation in all of its programs and courses and provides an accessible academic environment for all students. This means that our classrooms, our virtual spaces, our practices and our interactions are as inclusive as possible and we work to provide a

welcoming instructional climate and equal learning opportunities for everyone. If you have an instructional need, please notify me as soon as possible.

The Aggie Core values of respect, excellence, leadership, loyalty, integrity and selfless service in addition to civility, and the ability to listen and to observe others are the foundation of a welcoming instructional climate. Active, thoughtful and respectful participation in all aspects of the course supports a more inclusive classroom environment as well as our mutual responsibilities to the campus community.

Statement on the Family Educational Rights and Privacy Act (FERPA)

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. Currently enrolled students wishing to withhold any or all directory information items may do so by going to howdy.tamu.edu and clicking on the "Directory Hold Information" link in the Student Records channel on the MyRecord tab. The complete FERPA Notice to Students and the student records policy is available on the Office of the Registrar webpage.

Items that can never be identified as public information are a student's social security number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.

Directory items include name, UIN, local address, permanent address, email address, local telephone number, permanent telephone number, dates of attendance, program of study (college, major, campus), classification, previous institutions attended, degrees honors and awards received, participation in officially recognized activities and sports, medical residence location and medical residence specialization.

Spring 2023 Covid Statement

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.