

Scientific Applications of Calculus I (PHY 190)

Fall 2022

Scott N. Walck

Course Information

Contact Information

- Instructor: Scott N. Walck
- Preferred names: Scott, Dr. Walck, Prof. Walck (I prefer not to be called by my unadorned last name.)
- Pronouns: He, his, him
- Office: Neidig-Garber 223
- Office Phone: 717-867-6153 (messages reach me by email)
- Email: walck@lvc.edu
- Web page: <http://quantum.lvc.edu/walck/>

Email is the best way to contact me. Many questions and issues can be solved over email.

Office Hours

Let's try to have in-person office hours in Fall 2022. I will be in my office every

Monday	11:00–12:00
Tuesday	11:00–12:00
Tuesday	1:00– 2:00
Wednesday	11:00–12:00
Friday	11:00–12:00

during the course of the Fall 2022 semester.

If you would prefer a Zoom meeting, or would like to schedule an in-person meeting at a time outside the office hours above, please send me an email to set that up. You can drop by my office any time to see if I am there. If I'm there, we can chat.

My Zoom personal room is

- Meeting ID: 744 519 1002
- <https://lvc-edu.zoom.us/j/7445191002>

Course Description

This course shows students how the things they are learning in calculus apply to science, especially physics, chemistry, and biology. We will address interesting problems that require pieces of calculus for their solution. The schedule for the course will follow that for Calculus I. Each week, we will address one or more topics from the Calculus I course. The instructor will give thoughts, attitudes, and opinions about the relevance of the topic to science and show how it relates to issues important in science. Weekly problem sets will engage the topic or topics in the context of situations that arise in scientific endeavors. We seek to understand how concepts in calculus might appear in practice.

Learning Objectives

It is expected that students will

1. describe physical situations using the mathematical language of derivatives
2. interpret one-dimensional kinematics in terms of derivatives and integrals
3. apply the language of calculus to Newtonian mechanics
4. calculate rates of change of position, velocity, and other functions
5. calculate acceleration as the time derivative of velocity
6. explain the need for calculus in mechanics

Textbook

There is no textbook for this course.

Class Attendance and Participation

Health request: if you have cold, flu, or COVID symptoms, please wear a mask.

I expect you to attend class and to participate by asking questions and working on the problems sets.

Plan

This course should make it easier and more pleasant to succeed in Calculus I by showing how the subject matter applies to science. Each week, we will discuss how the topics covered in Calculus I are used in physics and related sciences. We will have a problem set each week that is due at the end of class or soon after. You may work together on the problems and ask me questions.

You will get the most out of the problem sets if you try each problem on your own first. The reason is that you need to train your brain to emerge from the confusion or blankness you experience when you first look at a problem and don't know exactly what to do. Think about how the tools at your disposal might apply to the problem in front of you. Don't spend forever trying to solve a problem on your own. Give it a reasonable effort, then seek help, either from me or a fellow student.

Grading

This course is graded on a pass/fail basis. If you come to class and do the problem sets, you will pass. I will let you know if you are in danger of failing.

Class Schedule

Week of	Topic
08/29	Functions, lines in a plane
09/05	Functions, combinations of functions, inverse functions
09/12	Graphing functions
09/19	Tangent lines, limits

09/26	Limit, continuity, derivative
10/03	Derivatives
10/10	Derivative properties, formulas, and patterns
10/17	Chain rule, related rates
10/24	Differentials, implicit differentiation
10/31	Maximums, minimums, mean value theorem
11/07	Derivatives and graphs
11/14	Area
11/21	Integrals
11/28	Fundamental theorem of calculus
12/05	Review

Course Objectives Alignment to Program Goals and Assessment of Course Objectives

Program Goal	Course Objective	Assessment
Graduates from our program will have a working understanding and knowledge of mathematics along with computational skills necessary for advanced work in physics.	describe physical situations using the mathematical language of derivatives	Problem Sets and in-class interaction
	interpret one-dimensional kinematics in terms of derivatives and integrals	Problem Sets and in-class interaction
	apply the language of calculus to Newtonian mechanics	Problem Sets and in-class interaction
	calculate rates of change of position, velocity, and other functions	Problem Sets and in-class interaction
	calculate acceleration as the time derivative of velocity	Problem Sets and in-class interaction
	explain the need for calculus in mechanics	Problem Sets and in-class interaction

College-Wide Course Policies

RESPONDUS or EXAMSOFTE POLICY

In this course, you may be asked to use a custom browser that locks down the testing environment within the Canvas learning management system. While using these programs, your instructor may require you to activate the video camera and microphone of your computer while completing the exam. Students who are not willing to provide the requested video and audio feeds may ask to take the exam using an alternative proctoring method. Students may arrange for the exam to be proctored at a professional testing center such as Sylvan Learning Centers. The student is responsible for finding the testing site and must pay any fees associated with testing. The Alternate Proctoring Request form can be obtained by contacting Kristen Shutter at shutter@lvc.edu or by phone at 717-867-6028.

EXPECTATIONS FOR STUDENTS IN FACE-TO-FACE CLASS SESSIONS

Students participating in face-to-face class sessions must adhere to the guidelines put forth in LVC's Community Covenant (<http://wordpress.lvc.edu/wordpress/lvcforward/2020/07/09/community-covenant/>). To facilitate contact tracing, students will be given assigned seats for the semester.

POLICY ON RECORDING CLASS SESSIONS

Audio and/or video recordings of the class sessions may be made by the College and/or by students who have been authorized by the LVC Center for Accessibility Resources to record classes as an accommodation for a disability. By participating in the class, all students consent to being recorded for these purposes. Any other recordings of class sessions are not permitted. Students participating in on-line courses are asked to respect the privacy of those participating in the class by ensuring that class sessions cannot be overheard by those who are not enrolled in the course.

ACADEMIC HONESTY POLICY

Any student who submits plagiarized work will be subject to the penalties described in the Student Handbook and the College Catalog and outlined in LVC's Academic Honesty Policy. This code asks each student to do his/her own work in his/her own words.

A student shall neither hinder nor unfairly assist the efforts of other students to complete their work. All individual work that a student produces and submits as a course assignment must be the student's own. Cheating and plagiarism are acts of academic dishonesty.

Cheating is an act that deceives or defrauds. It includes, but is not limited to, looking at another's exam or quiz, using unauthorized materials during an exam or quiz, colluding

on assignments without the permission or knowledge of the instructor, and furnishing false information for the purpose of receiving special consideration, such as postponement of an exam, essay, quiz or deadline of an oral presentation.

Plagiarism is the act of submitting as one's own, the work (the words, ideas, images, or compositions) of another person or persons without accurate attribution. Plagiarism can manifest itself in various ways: it can arise from sloppy note-taking; it can emerge as the incomplete or incompetent citation of resources; it can take the form of the wholesale submission of other people's work as one's own, whether from an online, oral or printed source.

Students who take part in violations such as cheating or plagiarism are subject to a meeting with the Associate Dean of Academic Affairs, who has the authority to take further action, up to and including expulsion from the College.

UNICHECK POLICY

In this course, you may be asked to submit some or all of your assignments for review by LVC's online plagiarism service, Unicheck. This service will compare the content of your work to content found on the internet and several proprietary databases. Any work submitted to this service may become part of the service's permanent collection of submitted papers. After your work is submitted, the service will generate an originality report, which will be sent to your instructor. Any student who submits plagiarized work will be subject to the penalties outlined in LVC's Academic Honesty Policy found in the Student Handbook and the College Catalog.

END OF TERM COURSE EVALUATIONS

Most courses at the College utilize a course evaluation system called EvaluationKIT. Near the end of the term, you will have the opportunity to evaluate the course in a number of key areas: learning environment, instructor performance, overall course structure, progress on relevant course objectives, and Constellation learning outcomes (if they apply). The faculty have approved a set of common questions that students will respond using an agreement scale. Please note that quantitative survey results and comments are used for course and instructor improvements and to indirectly measure the progress on relevant student learning objectives.

POLICIES REGARDING ACCESSIBILITY RESOURCES

Individuals with disabilities are guaranteed certain protections and rights of equal access to programs and activities under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Therefore, Lebanon Valley College recognizes the responsibility of the college community to provide equal educational access for otherwise qualified students with disabilities.

In-Person and Online Courses: Any student who needs accommodations is invited to provide letters from the Center for Accessibility Resources and discuss accommodations with me.

Any student who feels they may need accommodations based on a documented disability or other condition that may affect academic performance should: contact The Center for Accessibility Resources, located in the Lebegern Learning Commons — Mund Suite 002. Students may schedule an appointment by calling 717-867-6028 or emailing hannafor@lvc.edu to determine if accommodations are warranted and to obtain an official letter of accommodation.

Assistive Technology is available to enhance your academic skills. The Center for Accessibility Resources, located in the Lebegern Learning Commons—Mund Suite 002, offers educational software and personal assistive devices for short-term loans. Available assistive devices include LiveScribe pens, mini iPads, digital recorders, headphones, and adaptive keyboards. Our student coordinator is available to meet with students throughout the semester to suggest devices and/or software aligned to individual student needs.

If a student believes that appropriate accommodations are being denied, the student may file a grievance. Procedures for filing grievances may be found at www.lvc.edu/offices-directories/center-for-accessibility-resources.

STATEMENT ON INCLUSIVE EXCELLENCE

LVC is a community of inclusive excellence. We affirm the rights of all persons to a superior educational experience that is characterized by respect for others. As such, this class and all classes at LVC, are places where our core values of inclusiveness, civility and appreciation of difference are affirmed.

POLICY ON PREFERRED NAMES AND PRONOUNS

Lebanon Valley College is committed to fostering an environment of inclusion and support, which includes honoring all its members' forms of self-identification. This policy provides uses of preferred first names and pronouns for students, faculty, staff, friends, and alumni who wish to provide them. Many members of the LVC community may use names other than their legal names to identify themselves. If the use of this different name is not for misrepresentation, LVC acknowledges that a preferred name may be used wherever possible. The preferred name will be recorded and used except where the legal name is required.

Although students, faculty, staff, friends, and alumni are free to determine the preferred name and pronoun they wish to be known by, the College deserves the right to deny a preferred name and pronoun if it is used inappropriately.

Gender pronouns are those pronouns that members of the community use to represent themselves. Gender pronouns can include, but are not limited to, he/him/his, she/her/hers, they/them/theirs, etc. Asking for and correctly using a person's pronoun is one of the most basic ways to show respect for a person's gender identity.

Preferred name and pronouns will be entered and accessible internally for members of the campus community. Lebanon Valley College expects all faculty, staff, and students to facilitate the use of preferred names and pronouns listed on the directory and class rosters.

TITLE IX STATEMENT

Lebanon Valley College prohibits discrimination on the basis of race, color, national origin, ancestry, religion/creed, sex, pregnancy, sexual orientation, gender identity or expression, age, disability, genetic information, marital/familial status, or veteran status in all programs and activities, as required by Title IX of the Educational Amendments of 1972, the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VII of the Civil Rights Act of 1964, and other applicable statutes and/or College policies. Lebanon Valley College prohibits discriminatory harassment and sexual harassment, including sexual violence and any type of sexual misconduct.

Title IX makes it clear that violence, harassment, and any type of sexual misconduct based on sex and gender are civil rights violations. If you or someone you know has experienced violence, discrimination, or harassment, support is available through Counseling Services, Health Service, the Chaplain's office, the Victim Advocacy Program, and Title IX deputies. Please refer to the Student Handbook or the College Catalog for specific contact information.

HYBRID AND ONLINE INSTRUCTIONAL EQUIVALENCIES

The faculty of Lebanon Valley College approved guidelines on Equivalent Instructional Activities that will be used to substitute for face-to-face contact hour requirements for this online or hybrid course. These activities are clearly documented in this syllabus. For further details, please review the approved Equivalent Instructional Activities.

POLICY ON STUDENT SUCCESS AND INTERVENTION

At Lebanon Valley College, we want you to succeed in and out of the classroom. Administrators and faculty work together to ensure not only academic success but a highly-productive and positive experience. If any LVC staff, administrator, or faculty member is concerned about you for any reason, they will submit a referral to our CARE team, and a team member will contact you to collectively work on a solution. You should consider it your assignment to follow through and accept assistance from the appropriate source(s). Don't be afraid or hesitant to seek help from these individuals: supporting you is their job! Be proactive and take control of your success.

THE CENTER FOR ACADEMIC SUCCESS

Located in the lower-level of Mund College Center, the Center for Academic Success serves to support, inspire, and cultivate student success. The key to performing well academically lies in frequently utilizing support services across campus; in fact, many of our top students utilize tutors to help prepare for exams, talk through challenging concepts, learn how to take effective notes, and more. For this reason, we staff over nearly 300 peer tutors in almost all 100 and 200-level classes, including subject-specific writing conferencing. We also offer weekly study groups called "Study Pods" for specific subjects that serve as a place to connect with classmates, ask questions, and work on homework as well as drop-in writing support from 7pm-9pm, Mondays through Thursdays. If you would like to work with a tutor, please fill out a tutor request form (also located on the CAS website).

In addition, the Center features an Academic Success Specialist, a professional staff member who mentors students by designing and implementing a plan for academic success. These "coaching" sessions focus on developing effective time management, organizational, test-taking, critical reading, note-taking, and study skills, as well as learning healthy behavioral techniques like stress management and self-motivation. Our Specialist is available anytime over the summer to meet with you. For more information on any of these services, visit the Center for Academic Success. To request an appointment, please email findyoursuccess@lvc.edu.

STATEMENT ON SUPPORTING MENTAL HEALTH

Your mental health, including excessive stress, anxiety, depression or problems with eating and/or sleeping can adversely influence your academic performance. At LVC we care about the whole person. If you feel that any of these issues are negatively impacting your performance, please contact our Counseling Services to consult with one of our professional counselors. During a brief phone conversation, they can assess your particular needs and help you make a connection to the services you may need. If you would like a phone consultation, just email counselingservices@lvc.edu and leave your contact information. A professional counselor will return your call or email the next business day. We will not check email after hours or over the weekend/vacation times. If you experience an emergency, please call 911 in your local area or text 741741 to request immediate assistance.