



Computational Problem Solving

ENGR 2310

Instructor Info —

Name: Tyler Williamson

Office: M W F: 9-10 am

Hours: T: 2-5 pm
R: 11 am-12 pm, 1-2 pm

Office: Hartung 315A

Email: tjwilliamson@anderson.edu

Course Info —

Prereq: PHYS 2240 (coreq),
MATH 2010 (coreq)

Meeting Days: M W

Meeting Times: 2pm-2:50pm

Location: Hartung 318

Lab Info —

Meeting Days: Friday

Meeting Times: LA: 1pm-2:50pm
LB: 3pm-4:50pm

Location: Hartung 314

Overview

This course will introduce the student to computer programming, with the specific aim of using computer programs to solve complex scientific problems.

Note: This is an entirely in-person course, although material will be replicated online to accommodate ill or quarantined students.

Material

Required Texts

None

Grading Scheme

		$grade \geq 93$	A	$73 \leq grade < 77$	C
Homework	30%	$90 \leq grade < 93$	A-	$70 \leq grade < 73$	C-
Quizzes	20%	$87 \leq grade < 90$	B+	$67 \leq grade < 70$	D+
Labs	20%	$83 \leq grade < 87$	B	$63 \leq grade < 67$	D
Projects ($2 \times 15\%$)	30%	$80 \leq grade < 83$	B-	$60 \leq grade < 63$	D-
		$77 \leq grade < 80$	C+	$grade < 60$	F

Note: As the instructor, I reserve the right to change the grade of any student, but only to that student's benefit and only under exceptional circumstances.

Learning Objectives

- Learn the basic elements of computer science (expressions, variables, flow of control, functions, etc.)
- Be able to write and execute computer programs
- Learn to use computers to manipulate and visualize data
- Learn how to write computer programs to solve complicated scientific problems

Course Requirements

Homework

Homework assignments are designed to give you practice and to help you explore new concepts on your own. Homework assignments will typically be submitted via Canvas.

Quizzes

Quizzes are designed to evaluate your understanding of the class on a conceptual level. They may be pen and paper or done on the computer and submitted electronically. I reserve the right to give a quiz without prior announcement.

Labs

You cannot learn programming solely by listening and watching. Labs provide a chance for hands-on experience under the guidance of the instructor, and will be some of our most valuable time together. Labs will typically consist of a small assignment that will be expected to be completed within the class period.

Projects

Projects are designed to assess your ability to apply the concepts being taught and practiced in class to a more complex problem.

COVID-19 Statement

As a member of the AU community, we acknowledge our covenant to protect and care for each other by embracing the following measures in this class: wearing a facial covering, maintaining 6' physical distance from others, practicing good respiratory hygiene, and using hand hygiene.

Students who are attending class virtually will be marked present if they participate in the scheduled class meeting via Kaltura (or other online course meeting platform) and engage with activities for the entire class time. If a student is excused from participating ahead of time, then she/he will be counted as present after submitting the assignments that are due that week by the deadline the instructor provides to you.

Students with possible COVID-19 symptoms should not attend class or attend any in-person gathering at Anderson University. They should report symptoms on the link provided at <https://anderson.edu/coronavirus/>

If you need to miss class for health reasons, please contact your instructor for possible modified due dates, at his or her discretion. However, **all students** are responsible for **all class assignments**.

During this coronavirus pandemic, the AU faculty and staff are making every effort to provide the best possible environment for face-to-face (F2F) instruction, as well as the best online environment, if we are forced to transition online. We encourage you to follow the community covenant, both on campus and off campus, in your educational environments as well as in your social environments. These guidelines are intended to maximize the amount of F2F instruction, by reducing the transmission rate of the coronavirus on campus and in the surrounding community. **As such, all Physical Sciences and Engineering department classes taught in face-to-face format will require properly worn facial coverings, 6' physical distancing, and good respiratory and hand hygiene.** Note that accommodations will be made for cases approved by the University for those students who cannot wear a facial covering for health reasons.

The department faculty will facilitate learning in this pandemic environment through the use of tools such as email, Canvas (learning management system), Kaltura (recording F2F lectures and labs), and/or other educational tools. These tools allow for flexible learning, in the cases where students are unable to attend class in person, either through illness, quarantine, the need to care for family members, or other situations.

Traditional F2F lab activities have included close collaboration between professor and student, and we will need to balance those learning opportunities with the need for physical distancing. Students will work individually, rather than in lab groups, and strict physical distancing will be enforced to the degree possible. Some laboratory experiences will utilize online tools to facilitate appropriate distancing.

It is imperative that we work together to slow the spread, through the community care covenant. It is very important that we communicate clearly with each other, extending grace towards each other, and solving problems together. Please contact your professor and/or the chair of the Physical Sciences and Engineering department, Dr. Benjamin McPheron, with any concerns, and keep us up to date regarding any changes in your class attendance.

Attendance Policy

Class attendance is fundamental to the teaching/learning process and any absence from a class results in a loss of learning for the student and learning community. In the current pandemic environment, it is imperative that we balance our face-to-face learning with the risk posed by the coronavirus. For this reason, if you need to miss class for any reason (such as feeling a little under the weather), participation in the equivalent online activities will not count as an absence presuming, if applicable, any required assignments are completed. It is the student's obligation to personally notify the course instructor when not attending the class face-to-face, in advance if possible, and to complete the required assignments for that class session prior to the due date, or at a modified date at the discretion of the instructor. In the case of an extended illness or a mandated quarantine, notify the professor as soon as possible to discuss options for modified due dates or other accommodations.

Late Work Policy

Course work should be submitted on or before the specified due date. Homework assignments are a critical component to understanding the material being discussed in class; it is therefore important to complete the homework in a timely fashion (while it is still the topic of discussion in class). For this reason, a penalty will be assessed on work turned in after the due date (see the table). This penalty is only a guideline, and I reserve the right to deviate from it, but only when it is to the student's benefit. Please communicate with me *before* an assignment is due if you think you will have trouble completing it on time.

Date turned in	Penalty
≤ 1 day late	-10%
> 1 day late and ≤ 3 days late	-20%
> 3 days late	-30%

Academic Integrity

As an institution of higher education committed to academic and Christian discovery, Anderson University expects faculty and students alike to maintain the highest standards of academic and personal integrity. "Anderson University seeks to support and promote qualities of academic honesty and personal integrity and regards cheating, plagiarism, and all other forms of academic dishonesty as serious offenses against the University community" (Faculty Handbook 4.23 Policy on Academic Integrity). See the student handbook for examples of plagiarism. When an instructor has additional definitions of academic dishonesty, they must be stated in the Syllabus at the beginning of the course.

You are expected to do your own work in this course. While collaboration with others on homework assignments is allowed, the work you turn in must be substantially your own. Be mindful that you personally are responsible for understanding the material during a quiz or exam. Any incidences of academic dishonesty will be handled according to University policy.

Academic Support

Accessibility and Accommodations

Important: If you have any special accessibility needs (i.e. use of screen reading software, captioning, etc.), please notify your professor and the Director of Disability Services for Students (Kissinger Academic Center for Excellence, Nicholson Library; 765-641-4223) as soon as possible. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Director of Disability Services for Students (Kissinger Academic Center for Excellence, Nicholson Library; 765-641-4223). To receive reasonable accommodations, you must contact Disability Services for Students, provide documentation, and request accommodations. You should also notify your course instructor during the first week of classes.

Kissinger Academic Center for Excellence

The Kissinger Academic Center for Excellence (KACE), located on the ground floor of the Nicholson Library, provides excellent resources in all areas of study regardless of academic ability. Many students can benefit from academic support and/or sharpen their skills through studying with others. In addition, excellent students often maintain their skills by working as peer tutors. The services are available for all enrolled students at no charge. For information, call 765-641-4225.

Pathways Program

Anderson University has a robust referral system that was created to connect students with the campus resources that will be most beneficial to them. Students may be referred by faculty for any student success issue. Students will be contacted by an appropriate staff or faculty member to provide support and care. For more information please see: anderson.pharos360.com.

Diversity and Inclusivity Statement

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Tentative Class Schedule

Subject to change

Basic Computer Science

Week 1	– Introduction Lab
Week 2	– Expressions, variables, and assignment statements Lab
Week 3	Expressions, variables, and assignment statements (II) Writing a program Lab
Week 4	Flow of control Conditional statements Lab
Week 5	Repetition statements Repetition statements Lab
Week 6	Functions Spring Break I Lab
Week 7	Functions Flow of control (putting it all together) Lab
Week 8	Data sequences (lists, tuples, dicts) Data sequences (lists, tuples, dicts) Spring Break II

Basic Scientific Programming

Week 9	Data visualization Advanced plotting with matplotlib
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	Lab
Week 10	Spring Break III
	Working with files
	Lab
Week 11	Working with files II
	Data files and strings
	Lab
Week 12	Basic data analysis (statistics and curve fitting)
	Basic data analysis (statistics and curve fitting)
	Lab
Week 13	Numerical methods (integration)
	Numerical methods II
	Lab
Advanced Topics*	
Week 14	Advanced numerical methods
	Advanced numerical methods
	Lab
Week 15-16	Numpy

**Time permitting*