CSE 110
Spring 2025- Section 01

Instructor Info

Nathan J. Russell
Duthie 216

Office Hours

Monday: 1:00 - 3:00 PM
Tuesday: 1:00 - 3:00 PM
Wednesday: 1:00 - 3:00 PM
Thursday: 10:00 - 11:00 AM
Friday: By Appointment

Lecture Info

Prerequisite: Math 180
Lecture Days: MWF
Lecture Time: 10:00 - 10:50
Lecture Room: Ernst 103

UNIVERSITY OF LOUISVILLE

Computer Science & Engineering

Mathematical Foundations for Computer Science

Course Description

Mathematical Foundations for Computer Science (3 Credit Hours)

The course covers mathematical and statistical concepts necessary for design and analysis of computer algorithms as well as developing system performance models, but visiting selected topics from number theory, vectors and matrices, combinatorics, probability, and statistics.

Learning Objectives

At the end of the semester the successful student will be able to:

- Demonstrate understanding of number theory, including divisibility, greatest common divisors, modular arithmetic, remainder arithmetic, prime numbers, number systems, and Euler's theorem.
- Demonstrate understanding of vectors and matrices, including multiplication, transpose, determinants.
- Demonstrate understanding of combinatorics, including pigeonhole principle, permutations, combinations, and binomial theorem.
- Demonstrate understanding of probability, including Bayes' theorem, random variables, expectation and variance.
- Develop understanding of statistics, including summarizing measured data, parameter estimation, and confidence intervals.

Required Materials

Computer & Internet Access

This course does not require any special materials. The instructor will provide Internet links to all required resources. Students will need to have reliable access to the Internet.

Student Collaboration & Cheating Policy

Students are encouraged to work and learn together. However, all submitted assignments should be original and the result of the individual's own work. Cheating or copying of assignments will not be tolerated. Student submissions are checked against sophisticated anti-plagiarism software. Students are not permitted to work together on exams or seek help (other than the instructor) to complete exams. Academic dishonesty will result in a failing grade for the assignment/exam and may result in a failing grade for the course.

FAQs

How do I contact the instructor and TA?

Do not send messages via BlackBoard. A Slack workspace has been created for this course and that is the preferred method for general questions. Check the Slack channels to see if your question has already been answered. Questions about grades should be sent via email to the TA.

How do I earn participation points?

Participation points are earned by attending class (in-person only), regularly logging into BlackBoard, and engaging in the Slack workspace.

Do I have to attend class in-person?

Online students do not meet in-person. Students enrolled in the in-person section should attend class meetings. The in-person lecture will be recorded and posted for all students to view as an additional resource. Lecture notes will be posted on BlackBoard. All students are required to review the posted lecture notes.

What if I have a question about a grade?

Your first contact should be the TA for the course via email. You will find the TA contact information on the course BlackBoard page. If the TA is unable to help then reach out to the instructor via email.

Grade Calculation

Final grades will be calculated using the following category weights:

Participation	5%
Homework	45%
Midterm Exam	25%
Final Exam	25%

Final letter grades will follow a plus/minus scale and are defined in the table below.

Grade	Percentage Range
A+	[97, 100]
A	[95, 97)
A-	[90, 95)
B+	[87, 90)
B	[85, 87)
B-	[80, 85)
C+	[77, 80)
C	[75, 77)
C-	[70, 75)
D+	[67, 70)
D	[65, 67)
D-	[60, 65)
F	[0, 60)

Homework will be regularly assigned throughout the semester. Students should check the course BlackBoard page on a daily basis.

Important Information About Assignments and Grades

- Due date extensions will not be granted for individual students.
- A student falling behind on coursework should consider withdrawing.
- Due dates will provide significantly more time than necessary to complete assignments. Students should start assignments as early as possible.
- Forgetting to complete an assignment/exam will result in a zero.
- Homework/Programming assignments have unlimited attempts until due date.
- Students will have one attempt to complete exams.
- Assignments will not be reopened after the due date.
- Extra credit will not be available for individual students. If extra credit opportunities become available, they will be announced on BlackBoard.

Title IX/Clery Act Notification

Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (852-2663), Counseling Center (852- 6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

Diversity and Inclusivity Statement

The University of Louisville strives to foster and sustain an environment of inclusiveness that empowers us all to achieve our highest potential without fear of prejudice or bias.

We commit ourselves to building an exemplary educational community that offers a nurturing and challenging intellectual climate, a respect for the spectrum of human diversity, and a genuine understanding of the many differences-including race, ethnicity, gender, gender identity/expression, sexual orientation, age, socioeconomic status, disability, religion, national origin or military status-that enrich a vibrant metropolitan research university.

We expect every member of our academic family to embrace the underlying values of this vision and to demonstrate a strong commitment to attracting, retaining and supporting students, faculty and staff who reflect the diversity of our larger society.

Accommodations for Students with Disabilities

The University of Louisville is committed to providing access to programs and services for qualified students with disabilities. If you are a student with a disability and require accommodation to participate and complete requirements for this class, notify me immediately and contact the Disability Resource Center (Stevenson Hall 119, askdrc@louisville.edu, 502-852-6938) for verification of eligibility and determination of specific accommodations.

Academic Integrity

Academic dishonesty is prohibited at the University of Louisville. It is a serious offense because it diminishes the quality of scholarship, makes accurate evaluation of student progress impossible, and defrauds those in society who must ultimately depend upon the knowledge and integrity of the institution and its students and faculty.

IT Support

Speed IT staff are available by appointment from 9 am to 4 pm to assist you with your technology needs. You may schedule an appointment by sending a detailed email including any relevant error codes and screen snips at SPDHelp@Louisville.edu (preferred) or 502-852- 7620.

Course Schedule

Midterm Exam Material

Week 1	Set Theory	Set Notation, Set Operations
Week 2	Set Theory	Domains, Complements, Famous Infinite Sets
Week 3	Basic Mathematical Structures	Matrices & Polynomials
Week 4	Combining Mathematical Structures	Advanced Mathematical Notations
Week 5	Number Theory	Divisibility, Quotient & Remainder, Number Systems
Week 6	Number Theory	Prime & Composite Numbers, Factoring, LCD, GCD
Week 7	Number Theory	Euler Theory
Week 8	Review & Exam 1	

Final Exam Material

Week 9	Linear Algebra	Systems of Equations, Matrices, Vectors
Week 10	Linear Algebra	Matrix Operations, Row Operations, Determinants
Week 11	Linear Algebra	Advanced Applications (Combining Theorems & Methods)
Week 12	Combinatorics	Counting Fundamentals and Formulas
Week 13	Statistics & Probability	Std Dev, Variance, Probability
Week 14	Conditional Probability	Bayes Formula
Week 15	Probability Distributions	Normal & Uniform Dist, Basic Confidence Intervals
Week 16	Course Review	

Final Exam (May 5 - May 8)