School of Computing
UNIVERSITY OF GEORGIA

Course Information Sheet
CSCI 2150
Introduction to Computational Science

Brief Course Description
(50-words or less)

Basic topics of scientific computing that are necessary for science and engineering students. Solving mathematical problems by different numerical methods. Quantitative reasoning concepts will be emphasized in comparing and verification of the correctness of the solutions. Mathematical software packages will be used. This course is intended for freshman and sophomore students.

Extended Course Description / Comments

Use this section to put additional information that's relevant to whom this course is targeting

This course fulfills Area III (Quantitative Reasoning) requirements. Introduction to MATLAB and other software packages for numerical and symbolic manipulation, computer arithmetic, solutions of systems of equations, differentiation and integration, root finding, interpolation and curve fitting.

Pre-Requisites and/or Co-Requisites

MATH 1113
Pre-Calculus

Or Permission of Department

Approved Textbooks
(If more than one, course text used during a semester is at the discretion of the instructor)

NO textbook. The instructor will use his own notes.
Author(s):
Title:
Edition:
ISBN-13:

Specific Learning Outcomes (Performance Indicators)

These are a (non-exhaustive) list of specific, measurable outcomes, as they relate to the course & program objectives.

These learning outcomes should avoid using ambiguous language such as "understand" or "familiar".

Performance indicators must include an action verb (indentifying the depth to which students should demonstrate performance), and the content referent that is the focus of the instruction (from ABET)

This course presents topics in mathematics that are most relevant to students studying science and engineering. At the end of the semester, all students will be able to do the following:

1. Use MATLAB for manipulating matrices.
2. Use MATLAB/maple for symbolic computation, such as finding the Taylor series of a function and evaluate its value at a certain point.
3. Distinguish the difference between the representation of floating point and integer numbers in the computer memory.
4. Distinguish between single and double precision representations of floating-point numbers and compute errors when floating point operations are involved.
5. Compare between numerical and exact solution and validate the results.
6. Solve linear system of equations using Gaussian elimination and available software.
7. Find the roots of a nonlinear function and examine its correctness.
8. Interpolate a table of values by using polynomials.

Program Outcomes

(These are ABET-Specified outcomes)

A. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions
B. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
C. Communicate effectively in a variety of professional contexts.
D. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
E. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
F. Apply computer science theory and software development fundamentals to produce computing-based solutions.

Relationship Between Student Outcomes and Learning Outcomes

	ABET Learning Outcomes						
Specific Learning Outcomes		A	B	C	D	E	F
	1	●	●	●	●	●	●
	2	●					●
	3						●
	4						●
	5						●
	6					●	●
	7					●	●
	8	●	●	●			●

Major Topics Covered
(Approximate Course Hours)

3 credit hours = 37.5 contact hours
4 credit hours = 50 contact hours

Note: Exams count as a major topic covered

1. Introduction to Scientific computing (3 hours)
2. Introduction to MATLAB and other available software packages for numerical simulations (8 hours).
3. Number systems and computer arithmetic (6 hours).
4. Solution of linear systems of equations (6 hours).
5. Differentiation and solving first order ODE (6 hours).
6. Integration and using Trapezoid rule (5 hours)
6. Root finding (5 hours).
7. Interpolation and curve fitting (5 hours).
8. Exams (6 hours)

Assessment Plan for this Course

Each time this course is offered, the class is initially informed of the Course Outcomes listed in this document, and they are included in the syllabus. At the end of the semester, an anonymous survey is administered to the class where each student is asked to rate how well the outcome was achieved. The choices provided use a 5-point Likert scale containing the following options: Strongly agree, Agree, Neither agree or disagree, disagree, and strongly disagree. The results of the anonymous survey are tabulated and results returned to the instructor of the course.

The course instructor takes the results of the survey, combined with sample student responses to homework and final exam questions corresponding to course outcomes, and reports these results to the ABET committee. If necessary, the instructor also writes a

	recommendation to the ABET committee for better achieving the course outcomes the next time the course is offered.
How Data is Used to Assess Program Outcomes	Each course Learning Outcome, listed above, directly supports one or more of the Program Outcomes, as is listed in "Relationships between Learning Outcomes and Program Outcomes". For CSCI 2150, Program Outcomes (a) and (i) are supported.
Course Master	Dr. Thiab Taha
Course History	Modified by Dr. Thiab Taha on Jan 1, 2024.