Fall 2007

CS 399: Computational Science Programming and Algorithms

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CS 399 Computational Science Programming and Algorithms

Section 90 – Fall 2007, Distance Learning
Wright State University, Dayton, Ohio
Last Update: August 27, 2007

Description:
Introductory course in programming and algorithms for students with an interest or degree option in Computational Science. Topics include the logic and design of procedural programs, floating point arithmetic, vectors, matrices, complex numbers, and elementary data structures. Applications to areas of science and mathematics. Students will learn the basics of C programming as well as the MATLAB computing environment. This distance learning section offered under “Selected Topics” in computer science. 4 quarter credit hours.

Prerequisites:
Wright State course numbers used below. Check course descriptions at:
http://www.wright.edu/academics/catalog/descriptions.html

Calculus I- MTH 229, Calculus II – MTH 230, Matrix Algebra – MTH 253, one introductory programming course (Java - CS 141, CS 208, CS 240; C/C++ - CEG 220; or FORTRAN - EGR 153) or permission of instructor.

Instructor:
Dr. Ronald F. Taylor, Russ Engineering Center Room 340, phone 937-775-5122, ronald.taylor@wright.edu
Office hours: 9:00 -11:00 a.m. Tu and Th (other times by appointment).

Required Textbooks:

Recommended Textbooks:

Required Software:
You will need access to MATLAB and a C compiler. Octave is a possible alternative to MATLAB.

MATLAB Student Edition with Symbolic Math Toolbox or access to a licensed edition. Check Math Works website:
http://www.mathworks.com/academia/student_version

Octave is free MATLAB-like programming environment. The graphics capabilities are somewhat limited and there is no symbolic math capability. Version 2.1.73 is the current stable version which can be downloaded from:
http://www.gnu.org/software/octave/

Dev C++ 4.9.9.2 is a free C/C++ complier and development environment. It runs under versions of Windows through XP. Other compilers/development environments may be used if they are ANSI C or C89 compliant. Dev C++ download:
http://www.bloodshed.net/dev/.devcpp.html

IMPORTANT: If you are going to try Octave or a C compiler other than Dev C++.4.9.9.2, please discuss first with the instructor.
Course Home Page and Distance Learning Tools – WebCT and Elluminate:

The main Course Home Page with link to content (requires Course username/password) homework and project assignments, links, reading assignments, documents, and Power-Point slides is available at: http://www.cs.wright.edu/people/faculty/taylor/cs399

WebCT is used to access Distance Learning tools such as Chat, Course username/password, Discussions, Grades, Submittal of Homework/Projects, and Whiteboard: http://wisdom.wright.edu/

A Wright State Campus Account is needed to access WebCT. This is available to all registered students.

The Elluminate distance learning tool may also be used for live scheduled interactive sessions.

Use of E-Mail:

This will be our initial primary mode of communication. All registered students will have access to a Wright State e-mail account. The instructor will use only that e-mail account to initiate communication with student. The instructor will reply to other e-mail accounts. IMPORTANT: Please include in any communication with instructor, a Subject which starts with “CS399”. For example, a student with a question about HW 1, would use as a Subject: “CS399: Question on HW 1 Problem 2 Modification”.

Grading Policy:

- One Mid-term Exam (25%)
- One Final Exam (30%)
- Projects, Homework Problems, Progress Reports, and Special Assignments (45%)
- Submit work via WebCT only: materials sent by e-mail will not be graded.
- Participate in any scheduled web conferencing sessions: counts as a Special Assignment.
- Grading scale: 90s – A, 80s – B, 70s – C, 60s – D, less then 60 – F.

Class Policies:

Exams will be proctored by arrangement with instructor. All Homework/Project assignments are due at time and date specified in WebCT. Grades on late assignments will be reduced by 10%. Submittals more than one day late will not be graded - "zero" grade assigned. Exceptions to the above policies may be made unusual circumstances when documentation is provided -- otherwise expect strict enforcement of the policies. All work submitted must be your own unless group assignments are explicitly made by the instructor; sharing of program code or copying problem solutions/codes from any source will result in at least a homework grade of "zero" and possibly a grade of "F" for the course. University procedures for plagiarism will be strictly followed. Sharing ideas and general mathematical and computer skills with others outside of class is encouraged. Students are expected to read, understand and follow the University Academic Integrity Policy at:

http://www.wright.edu/students/judicial/integrity.html

Responsibilities as a Distance Learner:

Taking a Distance Learning course requires a commitment of time and effort which may be greater than usual lecture classes. You need to be motivated to complete reading assignments, homework, and projects on a timely basis. This particular Distance Learning class requires an interest in scientific computation, applied mathematics, as well as a familiarity with at least one programming language. Students who are to be successful in this course must be willing to communicate with the instructor and others, as needed, in the class. The checking of your Wright State e-mail account is essential on a daily basis to get current information from the instructor. The Course Home Page will be updated frequently and students must become quickly familiar with how to locate course materials. The benefits of Distance Learning are a sense of independence to work at your convenience and, to a great degree, at your own pace. The instructor will make every effort to keep the content of the Course Home Page current and to respond to e-mail from students on a timely basis.
Topical Syllabus:

Topics and order covered may vary. See Course Home Page Contents link for readings, homework, and projects.

- Introduction to computers and scientific computing
- Number systems, floating point representation, and numerical considerations
- Overview of procedural, object oriented, and programming languages and environments
- Computational science problem statements and the development of algorithms
- Basics of logic and representation of processes: pseudo-code and flow-charts.
- Introduction to C and MATLAB
- The edit-compile-link-run process in C
- Basics of data types and structures in C
- Flow of program control: sequential, selection, looping in C and MATLAB
- Assignment statements and representation of equations and formulas
- Use of library and user-developed functions and passing data
- One and two dimensional arrays and operations in C and MATLAB
- Debugging techniques
- File I/O
- Applications and practice programs included at all stages in the course

Important Dates:

- September 4, Tuesday. Official start of classes
- September 24, Monday. Last Day for All Students to Drop a Class Without a Grade
- October 5, Friday. Mid-term exam: Schedule time with instructor
- October 22, Monday. Last Day for All Students to Drop a Class With a Grade of W
- November 10, Saturday. Last Day of Fall Quarter Classes
- November 12, Monday. Veteran's Day Holiday Observed (University Closed)
- November 16, Friday. Final exam: Schedule time with instructor
- Each Friday by 6:00 p.m. WebCT Submittal of Homework, Projects, or Progress Report