CSS455 Introduction to Computational Science and Scientific Programming
Course Syllabus-Winter 2012 (Revised 2/6/12)

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Office Hours: Monday/Thurs: 11:30-12:30; Tues/Wed: 3:30 – 4:30. All are in UWBB-225; Mon/Wed It is best to check with me ahead of time, even for a visit during normal office hours, <u>especially if you are making a special trip for that purpose</u>.

Class Times: 1:15 -3:15 PM , Mondays and Wednesdays   Room UW2-105

Prerequisite: BCUSP 125 (Calc II) and either CSS 162 or CSS 341.
Mid Term Exams: Jan 25 and Feb 22

Final Exam: Mar 12

Texts: "Guide to Scientific Computing", 2nd edition, by Peter R. Turner (CRC Press, 2001)

Supplementary Material: Several journal articles and book chapters may be included <u>as required reading</u> in the course. They will be made available to you in electronic format on the electronic reserves link for the course.

Reserve Material: The text books are on the course reserve shelf in the library. A number of computer science related reference manuals are available as E-books from the library. From time to time, journal articles and book chapters may be included as required reading in the course. They will be available on electronic reserve.

Course Description: Students study scientific computing, with a particular emphasis on those fundamental numerical algorithms that are relevant for numerical calculus, solution of equations, and linear algebra.   Serial and parallel solutions to problems will be obtained utilizing computational environments such as Matlab.. Group projects address current computational problems in the sciences and engineering.

Specific Course Goals

To gain understanding and facility with:
- Numerical analysis methods and issues that are relevant to scientific computing, especially those involved in linear algebraic methods..
- Programming some of these basic methods using high level environments such as Matlab and Maple.
- Use of distributed computing resources to implement parallel algorithms.

Partner Assignments. You will be divided by the instructor into groups. These groups will be the basis for: a)discussions, some homeworks, and active learning exercises both in class and out of class, and b) several projects due during the term.

Class Participation, Homework and Collaborative Problems.

Class Participation. Significant class time will be spent in discussion, workgroup problems, active learning exercises, in-class problem solving, occasional in-class quizzes, and student presentation. Students will be assigned grades based on their participation in these class activities as well as follow-up questions to be done after class. *If you are missing from class, you cannot make up the participation grade.*

Homework Problems.
There will be 6-8 homework problem assignments given during the term. They may take the form of essay questions, analytical problems, programming exercises, or abstracts of papers to be read. Some of these will be individual efforts, and some will involve a collaborative effort with your homework partner. We may have discussions of these problems in class with your study group before they are due. In those cases, you will be expected to prepare a rough draft of the homework, which will not be graded as such (see below), but simply handed in before the discussion of them during class. The final version of the homework (to be graded) will generally be due before the next class meeting following the discussions; *the homework will receive no more than half credit if the rough draft was not handed in <u>before</u> the discussions*. In general, neither rough drafts nor final copies of homework will be accepted late. *An exception to this rule will be made in the case of illness or family emergency (see below).* In some cases you or your group will be asked to make (graded) presentations of the homework or workgroup problems.

The homework assignments and general in-class participation will be graded and contribute respectively 20% and 5% to your overall grade. In some cases the evaluation may be "spot grading" if that is all time permits. All homework assignments will be turned in electronically at the Catalyst drop-box.

Machine Projects.
There will three machine problems (MP's) assigned. These will be Matlab programming assignments more involved than the typical homework. They must be done collaboratively with your partner and will be handed in separately from the homeworks. These machine projects will count   30 % of your course grade. If the number of students in class is not even, the single group with three partners will also lead a class discussion of each project after it is completed. All Machine Problem assignments will be turned in electronically at the Catalyst drop box.

Back-up Copies. You are responsible for maintaining backup copies of all assignments, computer programs, etc. If an assignment should be lost or misplaced during the submission or grading process, it is your responsibility to provide a copy of that assignment upon request. Always maintain current backup copies of all of your work. Computer crashes <u>do not qualify</u> as "emergencies" in this class.

Tests and Final Exam

The two midterm tests will each cover approximately 1/3 of the course material. The final exam will emphasize the last 1/3 of the course material. Because this type of knowledge is cumulative, the tests and examinations will always have a cumulative nature to them. The tests and exams will generally be mixtures of short answer, more detailed problems, programming exercises, and essay questions. Some true/false or multiple choice questions may also be used. **The exams may involve some practical problems using Matlab.** Most exam and test questions will be graded primarily for mathematical/computational content and your understanding of the concepts involved. Errors in grammar, spelling, etc., will influence these grades to the extent that they may make it difficult to understand your reasoning and explanations.

Classroom Rules. These basic rules, in addition to the requirements of the UWB Handbook, apply to the instructor and all students at all times in the classroom. If you cannot observe them at any time, you are expected to leave the classroom:
- No use of computers for web surfing, e-mail, or any other activities not directly related to class.
- No headphones, blue tooth earphones, etc in the classroom.
- No cell-phone calls, rings, musical interludes, text messaging, etc., during class.

- All views are to be heard and engaged respectively. As scholars, we are expected to analyze subject matter critically and express reasonable positions that are based on logic and fact rather than on emotion.

Attendance: Class & Exams. Any excuse for missing an exam *other than illness or family emergency* must be cleared with me at least one week ahead of time. If you cannot attend class on an exam day because of illness or emergency, you are expected **before class** to contact me by phone, leave a voice mail message, leave a message for me with the Computing and Software Systems office, or leave me an e-mail message. Failure to notify me in one of these ways will result in you not receiving consideration for a make-up examination.

Regular class attendance is expected, although roll calls will not be generally taken. If you are not present to participate in-class activity, that will, of course, profoundly affect your grade on that assignment. Missed in-class work (for whatever reason) *cannot* be made up.

Late Assignments. Assignments with due dates will not be accepted late, *unless otherwise noted in the assignment instructions*. If you are out of town on an assignment due date, it is your responsibility to arrange for internet access and submit the assignment electronically or to submit it before you leave.

Documented Disabilities
If you believe that you have a disability and would like academic accommodations, please contact Disability Support Services at 425.352.5307 or at rlundborg@uwb.edu. After an initial intake appointment, you should be prepared to provide documentation of your disability in order to receive assistance.

Academic Honesty
The highest standards of academic honesty will be expected in this class. Cheating and plagiarism in any of their forms are unacceptable. At the least, a grade of zero will be assigned to any work that is the product of cheating or plagiarism. Work that is assigned to you alone is to be accomplished by you alone. When formal collaboration on assignments is permitted (e.g. MP's), that fact will be made explicit. Assume that all assignments are to be individual work unless I indicate otherwise.
The official UW Student Conduct Code and an amplification prepared for UW students generally may be of use to you.   Each student is responsible to read and understand that information. *It is your responsibility to clarify with me any uncertainty that may exist on this question. Do not assume that an action is acceptable; ask me to be sure.*

> **Collaboration:** Some assignments (most HW's) are individual, while others (MP's) are formal collaborations with your partner.. Discussion of problems with fellow students is ok, provided you do not exchange algorithms, or copy code, or give specific answers to problems. *You may look to the other students for hints and suggestions about how to*

approach the problem, not for solutions to it. You may always discuss any problem with me. You are expected to subscribe to the highest standards of honesty. Failure to do this constitutes plagiarism. Plagiarism includes copying assignments in part or in total, debugging computer programs for others, verbal dissemination of algorithms, and results, or using solutions from other students, solution sets, other textbooks, etc. without crediting these sources by name. Plagiarism will not be tolerated in this class, any more than it would be in the "real world". Any student guilty of plagiarism will be subject to disciplinary action. In the "real world", you are responsible for the security of your intellectual properties. In our case, you are responsible for the security of your source code (either on public hard disk, or on printed copies) and copies of your homework assignments. Remember to erase your work from all public hard disks, and to dispose the hard copies of your source code and assignments with care. If someone has identical solutions to yours, you are necessarily a suspect of plagiarism.

Work turned in for this course may be subject to electronic checking for plagiarism.

Grades.

The final grade will be determined numerically by averaging your scores with the following weights:

Final Exam	15%
1st Midterm Exam	15%
2nd Midterm Exam	15%
Machine Projects (MPs)	30%
Homework Sets	20%
Participation/in-class Activities	5%

Most grades given during the course of the term and the overall course grade will be based on a 100-pt scale. The **official decimal class grades** (0.0 - 4.0) will be determined from a weighted average of your individual grades. A weighted average of 96 will be assigned a decimal grade of 4.0, and a weighted grade of 55 will be assigned a decimal grade of 0.7. Intermediate grades will be determined by a linear relationship between these two limits. This scale represents a *minimum* decimal grade. If I judge it to be appropriate, I will give higher grades than those indicated by this scale. Based on experience, the class GPA will likely fall in the range 2.8-3.2 (a "B" average).

The following table represents the official UW conversion of standard letter grades to the UW decimal grade scale and the conversion to the 100-pt scale used in this class:

	A Range		B Range			C Range			D Range		
Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Min Decimal	3.9	3.5	3.2	2.9	2.5	2.2	1.9	1.5	1.2	0.9	0.7
Min 100-pt	95	90	86	82	77	74	70	65	61	57	55

Library Materials: The hard-copy reserve shelf for this course will include several monographs. There is a link on the course home page that connects to the library reserve catalog. Many useful reference materials are to be found in one of the UW libraries on the UWS campus rather than at UWB. These can be obtained with little effort via electronic document delivery or the courier service.   Make sure you know how to use this service.

The electronic reserve page for the course has a number of journal articles that we will be reading during the course of the term. If you wish hard copies of these articles, you are responsible for printing them. There is a link to the E-Reserve on the course home page.

Use of E-Mail

You will be required to use e-mail as part of this course. Since our personal contact hours are quite limited, this will be a major avenue for communication. In addition, I will use the class e-mail list, listserve, and web page as means of broadcasting information to the class. It is assumed that class members are reading their e-mail on a daily basis. You may, of course, read your e-mail anywhere of your choosing, but it is required that you will have an active account of the form UWNetID@u.washington.edu that you check or forward daily. You can set up your account from the UW Web page. There is also a link on our course home page that takes you to UW on-line documentation that explains how to set up an account, how to send e-mail, etc.

There is a web-based U-mail form set up that allows you to send me either identified or anonymous e-mail from the browser. It can be found at URL**:**
https://catalyst.uw.edu/umail/form/jackels/3940
and there are links to this Umail form on the course home page.

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Class Listproc

A listserver has been set up for the class. Any message or reply sent to this address is rebroadcast to the entire class. You are welcome to use this when you want to communicate with the entire class. Your UWNetID e-mail account is automatically subscribed to this listproc. The e-mail address for this is**:**
css455a_wi12@u.washington.edu

Note the single underscore between "css455a" and "wi12"; it is required.

Use of Class Discussion Board

I have set up a computer discussion board for our use. This is an excellent medium for class discussions. Any class member can post to the bulletin board. It forms a "running" conversation that can be about the lectures, problem assignments, etc. **It will be the primary site for questions and discussion about the course or homeworks.** I am using Go-Post for this purpose. The bulletin board is found at: https://catalyst.uw.edu/gopost/board/jackels/19911/

A link to this bulleting board will appear on the course web site. Your access to the board will be via UWNetID. After you login to the board, you may click on "Profile" and then click on "Notifications" to select whatever notification you may prefer.

Electronic Submission of Assignments

Most assignments for this course will be submitted partially or entirely electronically. Detailed instructions are found in the assignments and on the drop box sites:

- The Catalyst drop-box site for individual homeworks (HW's) is found at:
  https://catalyst.uw.edu/collectit/dropbox/jackels/19112
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- The Catalyst drop-box site for the machine programming problems (MP's) done with your partner is found at:
  https://catalyst.uw.edu/collectit/dropbox/jackels/19114

Course Home Page

My personal home page is found at the URL:
http://faculty.washington.edu/jackels

Click on the entry referring to this course and you will find yourself at the course home page: http://faculty.washington.edu/jackels/css455.w12/

Computer Use.

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In this class you may make use of the local Windows system and the Linux machines in room 321. You should test out your accounts on these systems (especially running Matlab) before you have an immediate need for them.

Tentative Class Schedule (subject to change)

Week	Date	READING	TOPICS
1	Jan 2		**HOLIDAY**
	Jan 4	Turner, App A	Introduction Matlab fundamentals and vector algebra in Matlab.
2	Jan 9	Turner, Ch1	Floating point Errors
	Jan 11	Turner Ch 2	Solution of Equations
3	Jan 16		**HOLIDAY**
	Jan 18		Cancelled due to weather
4	Jan 23		Matrix computations
	Jan 25	Turner 7	Linear systems
5	Jan 30		**Exam 1**
	Feb 1		Continuation
6	Feb 6	Turner Ch 3:	Function Evaluation
	Feb 8	Turner Ch 4	Interpolation
7	Feb 13		Continuation
	Feb 15	Turner , Ch 5	Numerical Calculus
8	Feb 20		**HOLIDAY**
	Feb 22		**Exam 2**
9	Feb 27		continuation
	Feb 29	Turner, ch 6	Differential Equations
10	Mar 5		Continuation
	Mar 7		Continuation
11	Mar 12	{review}	**Final Exam**

Week	Date	MP's (Sun's)	Hwk's (Sat's)	Miscl (various)
1	Jan 5			Class Survey (Thurs)
	Jan 7		HW0- due	
2	Jan 14		HW1 due	
3	Jan 21		HW 2 due	
4	Jan 22	MP1 due		
5	Feb 4		HW 3 due	
6	Feb 11			
7	Feb 12	MP2 due		
	Feb 18		HW4 due	
8				
9	Mar 3		HW5 due	
10	Mar4	MP3 due		
	Mar 10		HW7 due	
11	Mar 12			

These assignments are to be turned in electronically before deadlines shown at the drop box sites.

Drop boxes have been set up at the course turn-in site:

https://catalyst.uw.edu/collectit/dropbox/jackels/19112   (HWs)

https://catalyst.uw.edu/collectit/dropbox/jackels/19114   (MPs)