C.S. 3723-001 - Numerical Methods for Engineering Computation  
Spring 2011

Class Time: 12:30-1:20 MWF  
Instructor: Emre Tokgoz  
Email: Emre.Tokgoz-1@ou.edu

Class Location: Carson 121  
Office: 115 Devon Hall

1. General Information

Prerequisites: (CS 1313 or CS 1323) and (Math 3113 or 3413).

Class home page: http://learn.ou.edu

Office Hours: My office hours sometimes have to be changed during the semester and the location of the office hours might have to change. My current office hours are located on the course web site. These are the initial ones this semester.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday</td>
<td>1:30-3:30</td>
</tr>
<tr>
<td>Friday</td>
<td>3:30-5:30</td>
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</tbody>
</table>

Appointments for additional office hours are best scheduled through email.

Required Materials:
• Working laptop computer with wireless network access, and at least 1 hour of battery life on a recharge.

Recommended Materials:

Teaching Assistant: There is no teaching assistant for this class.

2. Topical Coverage

Course Description: Basic methods for obtaining numerical solutions with a digital computer. Included are methods for the solutions of algebraic and transcendental equations, simultaneous linear equations, ordinary and partial differential equations, and curve fitting techniques. The methods are compared
with respect to computational efficiency and accuracy. Any student who earns credit in C S 3723 cannot receive duplicate credit for AME 3723, CH E 3723, or PE 3723. This course may not be taken for graduate credit within the College of Engineering

Expected Abilities After Completing C.S. 3723:
This course helps enable students to achieve (by the time of graduation) the following outcomes:
A: An ability to apply knowledge of computing and mathematics appropriate to the discipline.
C: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
I: An ability to use current techniques, skills, and tools necessary for computing practice.
J: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
K: An ability to apply design and development principles in the construction of software systems of varying complexity.

Topical Coverage in Textbook:
2. Floating Point Representation and Errors
3. Locating Roots of Equations
4. Interpolation and Numerical Differentiation
5. Numerical Integration
7. Systems of Linear Equations
8. Additional Topics Concerning Systems of Linear Equations
9. Approximation by Spline Functions
10. Ordinary Differential Equations
12. Smoothing of Data and the Method of Least Squares
15. Partial Differential Equations

3. Course Policies

Class Attendance: Class attendance is important because we will discuss concepts and examples that are not in the textbook. You are responsible for everything that is announced in class, independent of whether you choose to attend or not.
**Class Home Page:** This class will use Desire2Learn software for our home page. The URL for the home page is [http://learn.ou.edu](http://learn.ou.edu). Login with your 4+4 (first four letters of your last name followed by the last four digits of your student number), using your standard OU password. If you have difficulty logging in, call 325-HELP. This software provides a number of useful features, including a list of assignments and announcements, an electronic mailing list, newsgroups, and grade book. I update this website several times a week. You should check the site daily. When I update the site, I will post an announcement telling you what has been added and where it is located. You are responsible for things posted on the site with a 24 hour delay.

**Class Email Alias:** Urgent announcements will be sent through email. It is your responsibility to:

- Have your university supplied email account forwarded to the location where you read email.
- Make sure that your email address on the course home page is correct and forwards email to the place where you read it. I’ll send out a test message during the first week of class. If you do not receive this message, it is your responsibility to get the problem resolved.
- Have your email program set up so that replying to your email will work correctly. You can send email to yourself and reply to yourself to test this. If you need assistance in accomplishing any of these tasks, contact 325-HELP. You are responsible for reading emails within 24 hours.

**Examinations:** There will be two midterm examinations and a final examination. Tentative dates for the examinations are given in the class schedule posted on the course home page. Missing an examination without a previously approved excuse will result in a grade of zero for that examination. If an examination is missed for a verifiable, documented, and approved reason the percentage of the grade coming from the final examination will be increased to 35 or 40% (depending on whether the first or second examination was missed). Makeup examinations are never available, except as required by University policy. During examinations students must sit in assigned seats.

**Final Examination:** The final examination is on Wednesday May 12 from 1:30-3:30 in our regular classroom. The final is comprehensive, as required by College of Engineering policy. No final examinations can be given early, except as required by University policy.
**Discussion Groups and Email:** The discussion group on the course home page should be the primary method of communication outside of class. This allows everyone in the class to benefit from the answer to your question, and provides students with more timely answers since I check the discussion group regularly. Matters of personal interest should be directed to email instead of to the newsgroup, e.g. informing me of an extended personal illness. Posting guidelines for the newsgroup are linked on the home page.

**Laptop Computers:** It is the responsibility of each student in this class to have a working laptop computer with ample battery and wireless internet connectivity available for every class. If your computer requires repair during the semester, it is your responsibility to make arrangements to have another computer available. A student without a fully usable laptop computer will be at a disadvantage in this class.

**Academic Misconduct:** All work submitted for an individual grade, like homework, should be the work of that single individual: neither their friends nor their tutor.

1. Do not show another student a copy of your homework or projects before the submission deadline. The penalties for permitting your work to be copied are the same as the penalties for copying someone else’s work.
2. If you choose to do your work on your computer, make sure that your computer account is properly protected. Use a good password, and do not give your friends access to your account or your computer system. Do not leave printouts or thumb drives around a laboratory where others might access them.

Upon the first documented occurrence of collaborative work, I will report the academic misconduct to the Campus Judicial Coordinator. The procedure to be followed is documented in the University of Oklahoma Academic Misconduct Code (http://www.ou.edu/studentcode). In the unlikely event that I elect to admonish the student, the appeals process is described in [http://www.ou.edu/provost/integrity-rights/](http://www.ou.edu/provost/integrity-rights/).

**Incompletes:** The grade of I is intended for the rare circumstance when a student who has been successful in a class has an unexpected event occur shortly before the end of the class. I will generally not consider giving a student a grade of I unless the following three conditions have been met.

1. It is close to the end of the semester.
2. The student has a grade of C or better in the class.
3. The reason that the student cannot complete the class is properly documented and compelling.
Accommodation of Disabilities: The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.

Holidays: The scheduled classes are cancelled on the following days with the following reason.

<table>
<thead>
<tr>
<th>Monday, January 17</th>
<th>Martin Luther King Day</th>
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<tbody>
<tr>
<td>MWF, March 12-20</td>
<td>Spring Break</td>
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University Deadlines: The table below summarizes important deadlines for students at the University of Oklahoma. It is the responsibility of the student to keep track of these deadlines if they may wish to withdraw from this class. Be warned that I follow university policy extremely literally. During the period when withdrawal can result in either a W or an F, I will give a W only if the student is receiving a D or better in the class.

<table>
<thead>
<tr>
<th>Event</th>
<th>Last Date</th>
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<tbody>
<tr>
<td>Last day to Add</td>
<td>January 21</td>
</tr>
<tr>
<td>Last day to Drop with refund</td>
<td>January 31</td>
</tr>
<tr>
<td>Last day to drop with automatic W</td>
<td>February 25</td>
</tr>
<tr>
<td>Last day to change to audit</td>
<td>April 1</td>
</tr>
<tr>
<td>Drop with grade of W/F without</td>
<td>April 3</td>
</tr>
<tr>
<td>permission of the Dean</td>
<td></td>
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Classroom Conduct: Disruptions of class will not be permitted. Examples of disruptive behavior include:

- Allowing a cell phone or pager to repeatedly beep audibly.
- Playing music or computer games during class in such a way that they are visible or audible to other class members.
- Exhibiting erratic or irrational behavior.
- Behavior that distracts the class from the subject matter or discussion.
- Making physical or verbal threats to any member of our learning community.
- Refusal to comply with faculty direction.
In the case of disruptive behavior, I may ask that you leave the classroom and may charge you with a violation of the Student Code of Responsibilities and Conduct.

4. **Homework**

**Language:** We will be using the LabVIEW programming language.

**Sharing Resources:** Immediately before homework assignment is due, I have my office hours and they often become very busy. While we will make reasonable efforts to meet the needs of as many students as possible, it is often impossible to fully meet the needs of all students during this busy period of time. For example, if there are ten students in my office during a given office hour, each student could expect to receive about six minutes of help. This limited amount of help may not be sufficient. Start your work early and get help before the rush.

**Software Tools:** Using commercial software without proper licensing is illegal, unethical, and absolutely unacceptable in this class. Fortunately, all of the software tools used in this class are available free of charge to students.

**Homework Submission:** Homework is submitted by the beginning of class either on paper, or before the start of class using the digital dropbox. If you scan your work for electronic submission, make sure it is legible.

5. **Evaluation**

**Grading Questions on Homework:** I will be grading all your work for this class. If you have any questions about the grading of these items, please see me during my office hours. All disagreements about the grading of projects or homework must be brought to my attention within one week of the item was returned, whether the student picked it up then or not.

**Examination Grading Questions:** If there is a dispute about the grading of an examination problem, you may stay after class the day the tests are returned to discuss it. If you cannot stay at this time, return the paper to me and stop by during my office hours. Once a test has been removed from the classroom after it has been returned, the grade is final and will not be changed, even if it is found to be in error.

**Desire2Learn Grade Summary:** Desire2Learn has a grade book that is used to store the raw data that is used to calculate your course grade. It is the responsibility of each student in this class to check their grades on Desire2Learn after each project or homework is returned. If an error is found, bring the grading document to me and I will correct it. The grade book does not understand how grades are
actually calculated in this class. It therefore may show things like percentages and total points that may be incorrect. The correct formulas for calculating grades are given in this document.

Midterm Examinations: In order to allow students ample time to complete the two midterm examinations, they will be given during the evening. Tentative dates are listed on the schedule, although these may have to change during the semester. The schedule is available online and will probably be updated many times during the semester.

Grading: There are four components to the course grade. They are weighted as follows.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Midterm 1</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>25%</td>
</tr>
<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

Homework is more lightly weighted to allow students to make mistakes and learn from them with smaller penalties. Completing these exercises is how most students meet the learning objectives that make it possible to be successful on the midterms and final, which are heavily weighted. Failure to do the homework usually results in failure of the course, not because they are so heavily weighted in the grading, but rather because the student doesn’t meet the learning objectives and does poorly on the examinations. The grading scale will be no higher than the following. It may be lower at the discretion of the instructor.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>90+</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>Otherwise</td>
</tr>
</tbody>
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Borderline Grade Decisions: Grades are rounded to the nearest whole number. Although it would be preferable that all grades are cleanly decided, it is usually the case that a few final course grades are decided by only a few points. I have an algorithm for determining grades in these difficult cases. A grade is a borderline grade if it is within two points of the next higher grade. Therefore, grades like 69 and 78 are borderline grades, but grades like 81 and 92 are not. The grade on the final examination will be used to determine borderline grades. If the grade on the final is below the threshold for the higher grade, the lower grade will be given. If the grade on the final is above the threshold for the higher grade, the higher grade will be given.