

MATH 665 - Numerical Analysis I

Section 1001, Fall 2016

(8/29/2016-12/7/2016)

Time and Venue: MW 10:00AM - 11:15AM, CBC C323
Office Hours: MW 11:45AM - 12:45PM, or by appointment
Textbook: Numerical Analysis (9th edition), by Richard L. Burden & J. Douglas Faires

CATALOG DESCRIPTION: Introduction to numerical mathematics and scientific computing. Topics including methods of error estimation, interpolation theory, numerical integration, and solutions of linear and non-linear equations. Emphasizes hands-on computer work based on these techniques.

Chapter 1	Mathematical Preliminaries and Error Analysis
Chapter 2	Solutions of Equations in One Variable
Chapter 3	Interpolation and Polynomial Approximation
Chapter 4	Numerical Differentiation and Integration
Chapter 5	Initial-Value Problems for Ordinary Differential Equations
Chapter 6	Direct Methods for Solving Linear Systems

PREREQUISITE: [MATH 182](#) and [CS 202](#) minimum or equivalent, better in [MATH 283](#), and either [MATH 330](#) or [MATH 365](#). Overall, the basis of this course requires single variable calculus, matrix algebra, and a very basic knowledge of computer programming (a little basic knowledge in any of the following computer languages: C, C++, FORTRAN, Java will be sufficient. Matlab or Mathematica can also be used.)

COURSE LEARNING OUTCOMES: Numerical analysis is the study of algorithms for computing numerical answers to mathematical problems (or mathematical models of physical problems). We shall introduce and analyze numerical techniques and algorithms for a variety of basic problems, studying their efficient computer implementation, robustness and reliability. This course will provide introduction to the basics of the modern numerical techniques when applied to problems of analysis and algebra. In particular, Numerical Analysis I includes the following important objectives:

1. In general, understand the following two objectives of numerical analysis:
 - (i) Find an approximation to the solution of a given problem.
 - (ii) Determine a bound for the accuracy of the approximation.

2. Find roots of functional equation by root-finding methods, including:
 - (i) Bisection method
 - (ii) Fixed-point method
 - (iii) Newton's method
 - (iv) Secant method
3. Use interpolating polynomials to fit tabulated data by approximating a function, including:
 - (i) Lagrange polynomial
 - (ii) Hermite polynomial
 - (iii) Cubic splines
4. Approximate the analytic differentiation and integration by numerical schemes, including:
 - (i) Forward, backward, three-point and five-point numerical differentiation formulas.
 - (ii) Richardson extrapolation and Romberg integration.
 - (iii) Trapezoidal, Simpson and midpoint and their composite types of numerical integration formulas.
 - (iv) Gaussian quadrature.
 - (v) know how to compute the degree of precision.

TEST AND GRADING POLICY: There are three (75 minutes) tests. Each test is worth 25%, the homework is worth the remaining 25%. All tests are noncumulative exam.

Grades will be assigned on the basis of total 100 points, distributed as follows:

Homework	25%
Three tests	25% each, total 75%
Total	100

Final course grades will be assigned as follows:

A	95-100
A-	90-94
B+	85-89
B	80-84
C+	75-79
C	70-74
D	60-69
F	0-59

NOTE: Your grade will be based **EXCLUSIVELY** on the tests, homework, and the attendance.

CLASS POLICIES:

HOMEWORK:

The homework problems that you should work after each lecture are on the assignment list. You are required to do the homework *outside of class* for each section after we have completed the lesson. Homework are collected on each Monday, and are returned to you on next Monday.

ATTENDANCE:

You are expected to attend class regularly. If you miss a class for any reason, you are responsible for all material covered, announcements made in your absence, and acquiring materials that may have been distributed in class. In borderline cases, attendance will be taken into consideration.

MISSED EXAMS:

You will have the opportunity to make up an examination given on a day you are absent if you can provide sufficient reason for missing the examination.

CALCULATORS:

A graphics calculator is useful as a study and learning tool when used appropriately. However, calculus is a collection of ideas which are not mastered through calculator skills only. Note that no calculators are allowed on quizzes, midterm and final examinations.

ACADEMIC INTEGRITY:

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at University of Nevada, Las Vegas, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others. Based on the University's [Student Academic Misconduct Policy](#), a range of academic sanctions may be taken against a student who engages in academic dishonesty.

LECTURE-BY-LECTURE BREAKDOWN (Tentatively):

WEEK	DAY/DATE	SECTION(S) COVERED
1	Monday Aug 29	CLASS BEGINS Introduction/1.1
	Wednesday Aug 31	1.2-1.3
2	Monday Sep 5	Labor Day Recess

	Wednesday Sep 7	1.3-1.4
3	Monday Sep 12	2.1
	Wednesday Sep 14	2.2
4	Monday Sep 19	2.3
	Wednesday Sep 21	2.4
5	Monday Sep 26	2.5
	Wednesday Sep 28	2.6
6	Monday Oct 3	3.1
	Wednesday Oct 5	TEST I
7	Monday Oct 10	3.2
	Wednesday Oct 12	3.3
8	Monday Oct 17	3.4
	Wednesday Oct 19	3.5
9	Monday Oct 24	3.6

	Wednesday Oct 26	4.1
10	Monday Oct 31	4.2
	Wednesday Nov 2	4.3
11	Monday Nov 7	4.4
	Wednesday Nov 9	TEST II
12	Monday Nov 14	4.5
	Wednesday Nov 16	4.6
13	Monday Nov 21	4.7
	Wednesday Nov 23	4.8
14	Monday Nov 28	4.9
	Wednesday Nov 30	5.1
15	Monday Dec 5	5.2
	Wednesday Dec 7	5.3
16	Monday Dec 12	10:10am-12:10pm TEST III

UNLV POLICIES

Academic Misconduct — Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

Copyright — The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) — The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy — Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching — The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:
<https://www.unlv.edu/provost/teachingandlearning>
<https://www.unlv.edu/provost/transparency>

Incomplete Grades — The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring and Coaching — The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895- 3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center — One-on- one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.

Rebelmail — By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. **Emailing within WebCampus is acceptable.**

Library Resources — Students may consult with a librarian on research needs. For this class, the subject librarian is https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Final Examinations — The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.