

**Dr. Donald Adongo, FH 6A-2**

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**Office Hours (via Zoom): MW 12:30 am – 1:20 pm; and by appointment**

**Section 1 CRN 85564**

**MAT 642 (01) CRN 85565**

**Meeting: 10:30 am – 11:20 am MWF FH 104**

<http://campus.murraystate.edu/faculty/dadongo>

**COVID-19 Information: see section XIV**

**DEPARTMENT: Mathematics and Statistics**

**COURSE PREFIX: MAT**

**COURSE NUMBER: 542**

**CREDIT HOURS: 3**

**I. TITLE:**

**Numerical Analysis**

**II. COURSE DESCRIPTION AND PREREQUISITE(S):**

Numerical solutions of differential equations, iterative techniques for solving linear systems, discrete least-squares methods, orthogonal polynomials, and approximating eigenvalues.

**Prerequisite(s):** MAT 338 and either MAT 442 or consent of instructor. Requires knowledge of a scientific programming language.

**III. COURSE OBJECTIVES:**

The student will:

- A. Solve systems of linear equations using numerical techniques;
- B. Perform linear and nonlinear regression analysis of a set of data points using the method of least squares;
- C. Solve Ordinary Differential Equations using the Taylor Series and Runge-Kutta Methods;
- D. Analyze the error associated with a numerical algorithm and develop techniques for reducing that error.
- E. Carefully develop rigorous proofs for various numerical methods.

**IV. CONTENT OUTLINE:**

- A. Iterative Solutions of Linear Systems;
- B. Approximation of Eigenvalues and Eigenvectors;
- C. Numerical Solutions for Ordinary and Partial Differential Equations;
- D. Smoothing of Data and the Method of Least Squares

**V. INSTRUCTIONAL ACTIVITIES:**

Lecture, daily assignments, group work, projects, reading assignments, oral presentations, and quizzes the material, as per instructor course design.

## VI. FIELD, CLINICAL, AND/OR LABORATORY EXPERIENCES:

Using Software e.g. MatLab, to simulate problems.

## VII. TEXT(S) AND RESOURCES:

*Numerical Mathematics and Computing, seventh edition by Ward Cheney and David Kincaid 2008; Thomson Brooks/Cole.*

## VIII. EVALUATION AND GRADING PROCEDURES:

Your grade will be based on EXAM grades, HOMEWORK grades, Lab (Computer) grades, and the FINAL EXAM. Forty five percent of the course grade will come from 3 major exams (each exam counts 15 percent of the grade) and twenty five percent of the course grade will come from the final exam. The homework grade will contribute 15 percent while the lab grade is worth 15 percent of the course grade.

### Grading Scale:

90 - 100 %	A
80 - 89 %	B
70 - 79 %	C
60 - 69 %	D
Below 60%	E

**Exams:** The Exams will test your comprehension of concepts and skills not covered on a previous exam. Exams may contain both problem-solving questions and essay questions. Exams occur for everyone (to be fair to everyone) on the scheduled date. Sometimes, however, extenuating circumstances do exist. If you absolutely must miss an exam, you are to call me (or leave a message with the office if I am not in when you call) before the exam to tell me why you cannot be at the exam. In addition, you must complete the "missed exam form" (see the course website) within one week. If you do not, you will get a zero on that exam with no opportunity to make it up. An excused missed exam will be made up in within two weeks (an extension may be granted in rare cases), with the grade to be determined as explained at that time. Our three semester exams will be **September 14, October 17, and October 30.**

**Final:** The Final will be a comprehensive exam covering any material addressed that semester. The Final exam will be on **Friday, November 20th at 3:30 p.m.** in FH 104.

**Homework:** Homework will be assigned and listed on the course web site. Homework must be completed in pencil, scanned and uploaded onto **Canvas** as a single document.

**Computer Project:** Computer assignments will be given with each chapter involving the computer language © MATLAB. The software (© Matlab) is available in the computer lab on the first floor of Faculty Hall. A familiarity with Matlab will be one of the goals for this course. Lab reports will be submitted via **Canvas**.

**Important Grade-dates:** The last day to drop a course without receiving a grade (or a W) is Friday, August 21. The last day to drop individual courses and receive a grade of "W" (no penalty) is Saturday, November 7. The last day to change a full semester class from AUDIT to CREDIT is August 21. The last day to change a full semester class from CREDIT to AUDIT is Saturday, November 7, if you qualify for an Audit. (See the Audit policy below.)

**B. Auditing:** To Audit the course you need my permission. You will be expected to participate in all tests and assignments with a course average of at least 25%, and you will be expected to attend with no more than 3 absences for the whole semester. If you switch to 'Audit' in mid-semester, you must meet all of the requirements of an ordinary auditor (mentioned above). In addition, you may not miss more than 7% of the remaining class periods and you may not have more than 3 absences for the entire semester. Thus, if you have already missed 4 or more class periods, you may not change to 'Audit.' Failure to meet any of these after being granted an Audit will result in the grade 'Au' being changed to an 'E.'

**Note:** Students taking the course MAT 642 or MAT 790 are required to do substantially more work than in the course MAT 542. This involves students working additional problems for homework, labs, projects and exams.

## **IX. ATTENDANCE POLICY:**

Students are expected to adhere to the MSU Attendance Policy outlined in the current *MSU Bulletin*.

If you miss class you are responsible for obtaining the day's notes and assignments. You are expected to attend every class period or your grade will suffer (indirectly) if you do not attend. Attendance will be taken. Note the following provisions on arriving late to class or leaving early:

Every two tardies (arriving late) will count as an absence.

Leaving class early will count as an absence unless you provide me with a reason in advance.

## **X. ACADEMIC HONESTY POLICY:**

Murray State University takes seriously its moral and educational obligation to maintain high standards of academic honesty and ethical behavior. Instructors are expected to evaluate students' academic achievements accurately, as well as ascertain that work submitted by students is authentic and the result of their own efforts, and consistent with established academic standards. Students are obligated to respect and abide by the basic standards of personal and professional integrity.

### **Violations of Academic Honesty include:**

**Cheating** - Intentionally using or attempting to use unauthorized information such as books, notes, study aids, or other electronic, online, or digital devices in any academic exercise; as well as unauthorized communication of information by any means to or from others during any academic exercise.

**Fabrication and Falsification** - Intentional alteration or invention of any information or citation in an academic exercise. Falsification involves changing information whereas fabrication involves inventing or counterfeiting information.

**Multiple Submission** - The submission of substantial portions of the same academic work, including oral reports, for credit more than once without authorization from the instructor.

**Plagiarism** - Intentionally or knowingly representing the words, ideas, creative work, or data of someone else as one's own in any academic exercise, without due and proper acknowledgement.

Instructors should outline their expectations that may go beyond the scope of this policy at the beginning of each course and identify such expectations and restrictions in the course syllabus. When an instructor receives evidence, either directly or indirectly, of academic dishonesty, he or she should investigate the instance. The faculty member should then take appropriate disciplinary action.

Disciplinary action may include, but is not limited to the following:

- 1) Requiring the student(s) to repeat the exercise or do additional related exercise(s).
- 2) Lowering the grade or failing the student(s) on the particular exercise(s) involved.
- 3) Lowering the grade or failing the student(s) in the course.

**If the disciplinary action results in the awarding of a grade of E in the course, the student(s) may not drop the course.**

Faculty reserve the right to invalidate any exercise or other evaluative measures if substantial evidence exists that the integrity of the exercise has been compromised. Faculty also reserve the right to document in the course syllabi further academic honesty policy elements related to the individual disciplines.

A student may appeal the decision of the faculty member with the department chair in writing within five working days. Note: If, at any point in this process, the student alleges that actions have taken place that may be in violation of the Murray State

University Non-Discrimination Statement, this process must be suspended and the matter be directed to the Office of Institutional Diversity, Equity and Access. Any appeal will be forwarded to the appropriate university committee as determined by the Provost.

**Note:** Faculty reserve the right to invalidate any examination or other evaluative measures if substantial evidence exists that the integrity of the examination has been compromised.

**In this Course, violations of Academic Honesty will result in a failing grade awarded on the particular exercise involved.**

## **XI. NON-DISCRIMINATION POLICY AND STUDENTS WITH DISABILITIES:**

### **Policy Statement**

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, sex, gender identity, sexual orientation, religion, age, veteran status, or disability in employment or application for employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities.

In particular and without limiting the preceding and pursuant to and consistent with the requirements of Title VI of the Civil Rights Act of 1964 and its regulations 34 CFR 100 et seq.; Section 504 of the Rehabilitation Act of 1973 and its regulations 34 CFR 104; Title IX of the Education Amendments of 1972, 20 USC 1681 et seq., and its regulations 34 CFR 106 et seq; and the Age Discrimination Act of 1975 and its regulations 34 CFR 110, Murray State University does not discriminate on the basis of race, color, national origin, sex, handicap, or age in its educational programs and activities. This non-discrimination in education programs and activities extends to employment and admissions and to recruitment, financial aid, academic programs, student services, athletics, and housing. Murray State is required by Title IX and 34 CFR part 106 not to discriminate on the basis of sex and the prohibition against sex discrimination specifically includes a prohibition of sexual harassment and sexual violence. Examples of prohibited sexual harassment and sexual violence can be found in the "Policy Prohibiting Sexual Harassment" which can be accessed via the link referenced in Appendix I.

For more information concerning the application of these provisions may be referred to: 1) the Executive Director of Institutional Diversity, Equity, and Access/ Murray State University Title IX Coordinator, Murray State University, 103 Wells Hall, Murray, KY 42071 Telephone: (270) 809-3155 Fax: (270) 809-6887; TDD: (270) 809-3361; Email: [msu.titleix@murraystate.edu](mailto:msu.titleix@murraystate.edu).

### **Students with Disabilities**

Students requiring special assistance due to a disability should visit the Office of Student Disability Services immediately for assistance with accommodations. For more information, students with disabilities should contact the Office of Student Disability Services, 423 Wells Hall, Murray, KY 42071. Telephone: 270-809-2018 (Voice) 270-809-5889 (TDD). **Email: [msu.studentdisabilities@murraystate.edu](mailto:msu.studentdisabilities@murraystate.edu). Our office will contact professors directly regarding any specific accommodation needs that may be applicable to their particular classroom setting.**

## **XII. STARFISH:**

***Your success is important!*** This course is part of the Murray State University student success initiative that utilizes the Starfish Student Success Network. Starfish may be used to communicate with you about your academic progress and get you help if you need it. Throughout the term, you may receive emails regarding your attendance, course grades or academic performance. To benefit, it is important that you check your Murray State email regularly and follow through on recommended actions. You may also be contacted directly by others on campus who care about your academic success and personal well-being. This may include your academic advisor and staff from Student Engagement and Success and other student support offices across campus. Starfish provides you with the opportunity to "Raise Your Hand" if you need help. Take advantage of this and other features by logging into your Starfish account through myGate. More information can be found at [murraystate.edu/starfish](http://murraystate.edu/starfish).)

### XIII. | OTHER REQUIRED DEPARTMENTAL OR COLLEGIATE COMMITTEE INFORMATION

**Electronic Communication Policy:** It is the default policy of the Department of Mathematics and Statistics that, without the prior consent of the course instructor, no device may be used for electronic communication in class. This shall include cell phones, smart-phones, computers, laptops, and tablets. In addition, this includes verbal calling, incoming calls, email, text messaging, the use of cell phone calculators on tests and quizzes, and the use of the wireless capabilities of calculators or other electronic devices. Unless given special permission in advance from the course instructor for potential cases of emergency or critical family situations, cell phones must be kept on silent and out of sight (i.e. secured to a person's belt or kept in a bag or purse away from desks). Should a student's cell phone be visible, ring, or should the student be engaged in some other form of unauthorized usage that the course instructor finds to be disruptive to the class, the student may be asked to leave class and not return for that class period, and be counted absent for that day. Similar restrictions and penalties apply to use of other electronic devices, unless permitted by the instructor for that class period. *In particular, I will count absent for that day any one texting during this class.*

### XIV. | COVID-19 RELATED INFORMATION |

#### **Instructional Hours Makeup**

*This 3-hour course will make up the 6 total hours by students engaging in recorded presentations as follows:*  
Video and reading materials will be assigned and students will then have a class discussion on the contents.

#### **Student Face Covering/Mask Policy**

- Students must wear face coverings/masks on campus, including but not limited to in-person classroom settings (classrooms are also required to be configured to achieve social distancing) and unless exempted with documentation by a medical professional.
- Student documentation should be registered with the Office of Student Disability Services, which may offer classroom accommodations regarding the face covering/mask student policy. The Office of Student Disability Services is located at 423 Wells Hall. Office staff can be reached by phone at 270-809-2018 or by email at [kashlock@murraystate.edu](mailto:kashlock@murraystate.edu).
- Failure to comply with the face covering/mask policy may result in the student being subject to the Murray State Student Disciplinary Procedure. This policy can be found here: <https://www.murraystate.edu/headermenu/administration/StudentAffairs/policies.aspx>.
- Students are not required to wear face coverings/masks in their residence hall room, in dining facilities upon receiving food/beverage, or in community restrooms/bathrooms.

#### **Counseling Resources on Campus**

Murray State University has three centers on campus that offer free and confidential mental health services for students. The University Counseling Center is located in Oakley Applied Science and will be offering a combination of in-person and remote services this fall. You can call them at 270-809-6851, email them at [msu.counselingcenter@murraystate.edu](mailto:msu.counselingcenter@murraystate.edu), or visit their website at [www.murraystate.edu/CounselingCenter](http://www.murraystate.edu/CounselingCenter). The Psychological Center is located in Wells Hall and will be offering primarily in-person sessions this fall. You can reach them at 270-809-2504 or visit their website at [www.murraystate.edu/PsychologicalCenter](http://www.murraystate.edu/PsychologicalCenter). The Counseling and Assessment Center is located in Alexander Hall and will be offering both in-person and remote services this fall. You can reach them at 270-809-3822 or visit their website at [www.murraystate.edu/CAC](http://www.murraystate.edu/CAC).

In a crisis situation, or after hours, please contact Murray State Police at 270-809-2222 or call 911 if you are off campus. You can also call the 24-hour crisis hotline at 800-592-3980 or contact the Crisis Text Line at 741-741.

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## **Class Attendance**

Students who are diagnosed with COVID-19, or who are otherwise required to quarantine, will contact their instructors immediately. Instructors will make adjustments to due dates or other course requirements in order to accommodate the severity of the illness and/or the availability of resources needed to complete tasks. If possible, students will continue to check Canvas regularly, and maintain regular communication with their instructors.

## **Racer Safe and Healthy Guidelines**

1. Regularly wash hands for at least 20 seconds and use hand sanitizer frequently
2. Check your temperature daily
3. If you feel sick, stay home
4. Wear a face mask
5. Utilize MSU Health Services (call, visit, or tele-visit)
6. Practice social distancing
7. Keep your workstation/room sanitized
8. Get a flu shot
9. Exhibit healthy behavior
10. Download the Apple COVID-19 app (or similar app) for daily use
11. Eat Well. Exercise. Get Plenty of Rest.
12. Make good choices