Dr. Donald Adongo, FH 6A-2

dadongo@murraystate.edu**, 809-2490**

Office Hours: MWF 9:30 – 10:20 pm; or by appointment

Section 1 CRN 16504

Meeting: 10:30 am – 11:20 pm MWF FH 108

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

DEPARTMENT: Mathematics & Statistics

COURSE PREFIX: MAT   **COURSE NUMBER: 524**   **CREDIT HOURS:** 3

I. **TITLE:**
Boundary Value Problems

II. **COURSE DESCRIPTION AND PREREQUISITE(S):**
Analytic and computational techniques for linear first and second order partial differential equations, initial, and boundary value problems. Classification, Fourier series, separation of variables, finite difference and/or finite element methods.
Prerequisite(s): MAT 309, 338, and 335 or consent of instructor.

III. **COURSE OBJECTIVES:**
The student will:
A. Classify second order partial differential equations;
B. Find solutions and discuss the existence of solutions for second order partial differential equations using maximum principle techniques;
C. Use separation of variables to solve second and higher ordered partial differential equations;
D. Use Sturm Liouville theory to analyze boundary value problems;
E.   Understand Fourier series and apply the techniques to solve second order partial differential equations;
F. Solve certain higher order differential equations;
G.   Study numerical aspects of solutions of boundary value problems in different domains;
H. Develop computational strategies and explanations related to research based questions involving higher ordered boundary value problems;
I. Introduce concepts to the class through integrative studies of numerical techniques and physical problems

IV. **CONTENT OUTLINE:**
A. Classification studies of second order partial differential equations;
B.   Maximum principles;
C.   Solutions strategies using Green's Theorem, separation of variables, and Fourier Series;
D.   Existence and uniqueness of second order boundary value equations in symmetric domains;
E. Solution investigation with Bessel Functions

V. **INSTRUCTIONAL ACTIVITIES:**
Lecture, daily assignments, group work, projects, reading assignments, and oral presentations.

VI. **FIELD, CLINICAL, AND/OR LABORATORY EXPERIENCES:**
None.

VII. **TEXT(S) AND RESOURCES:**
Applied Partial Differential Equations with Fourier Series and Boundary Value Problems Fifth Edition, by Richard Haberman.

VIII. **EVALUATION AND GRADING PROCEDURES:**
Your grade will be based on homework, presentations, and exams. Homework will be worth 20 percent, presentations will be worth 10 percent, two major exams 40 percent (each exam counts 20 percent of the grade) and 30 percent of the course grade will come from the final exam. The grading scale will be:

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

Exams: The two semester exams will be **February 14**, and **March 20**.

Final: The Final will be a comprehensive exam covering any material addressed that semester. The Final exam will be on **Thursday, May 7th** at **10:30 a.m.** in FH 108.

Homework: No late homework will be accepted.

Important Grade-dates: The last day to drop a course without receiving a grade (or a W) is Friday, January 17. The last day to drop individual courses and receive a grade of "W" (no penalty) is Friday, April 17. The last day to change a full semester class from AUDIT to CREDIT is Friday, January 17. The last day to drop a full semester class with W grade assigned is Friday, April 17. The last day to change a full semester class from CREDIT to AUDIT is Friday, April 17, if you qualify for an Audit. (See the Audit policy below.)

No classes during Martin Luther King Jr. Day January 20, Spring Break March 16-20.

 Auditing: No Audit.
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IX. ATTENDANCE POLICY:
Students are expected to adhere to the MSU Attendance Policy outlined in the current MSU Bulletins.
Class attendance will be taken daily. 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. For each absence above two, I will deduct one half percentage points from your final course grade. To level the playing field between those who must miss classes because of MSU and those who do not, the only kind of absence which will not be counted in this regard is a university-required absence.

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 Equal Opportunity. Any appeal will be forwarded to the appropriate university committee as determined by the Provost.

XI. NON-DISCRIMINATION POLICY AND STUDENTS WITH DISABILITIES:

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.

Services for Students with Disabilities Statement

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)
Click here to enter text.

XII. 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 will be counted absent for that day and may be asked to leave class and not return for that class period. Similar restrictions and penalties apply to use of other electronic devices, unless permitted by the instructor for that class period.

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Please fill out this portion, detach and return to the instructor by **Friday January 17, 2020**.

By my signature below, I certify that I have received a copy of the course syllabus for MAT 524-(01) taught by Dr. Donald Adongo during the Spring Semester of 2020. Furthermore, I certify that I have read and understand the contents of the course syllabus.

 Printed Name: ....

Signature: ....

Date: ....