Savannah State University
New Programs and Curriculum Committee
Summary Page – Form I

1. **Submitting College:** COST
2. **Department(s) Generating The Proposal:** Engineering Technology & Mathematics
   Choose an item. (if needed)
3. **Proposal Title:** Addition of a new Course
4. **Course Number(s):** **MATH 4301-**
5. **Course Title(s):** **Survey of Partial Differential Equations**
6. **Effective Date:** Spring **Year: 2013**
7. **Brief Summary of Proposal:** This course is designed to provide an introduction to some elementary partial differential equations. A number of applications to actual problems will be discussed. Students will also further develop their programming skills in MATLAB, and will use them to solve a range of problems introduced during lectures
8. **Type of Proposal:** New Course If other, please describe: Click here to enter text.
9. **Impact on Library Holdings**
   Existing: Click here to enter text.
   Additional: N/A
   Deletions: N/A
10. **Impact on Existing Programs:** The existing courses in the department of mathematics do not cover partial differential equations. This course is specifically designed to strengthen the Engineering and Applied Mathematics research competencies and skills of Savannah State University students and to help them progress to Engineering and Applied Mathematics research careers. This course will be used as a technical elective course in the Mathematics grid.
11. **Additional Resources Required**
    Personnel: NONE
    Non-personnel: NONE
12. **Approvals:**

- Department Curriculum Committee Signature _____ Date 10/10/12
- Department Chair Signature _____ Date 10/10/12
- College Curriculum Committee Signature _____ Date _____
- College Dean Signature _____ Date 10/11/12
- Vice President of Academic Affairs Signature _____ Date _____
  (Chair of the New Programs and Curriculum Committee)

- Faculty Senate

Signature_____Date_____

Savannah State University
New Programs and Curriculum Committee
Course Addition Page – Form II

1. **Course Number:** **MATH 4301**

2. **Course Title:** **Survey of Partial Differential Equations**

3. **Catalogue Description:** This course is designed to provide an introduction to some elementary partial differential equations. A number of applications to actual problems will be discussed. Students will also further develop their programming skills in MATLAB, and will use them to solve a range of problems introduced during lectures

4. **Rationale:** Partial differential equations are often used to construct models of the most basic theories underlying physics and engineering. The goal of this course is to develop the most basic ideas from the theory of partial differential equations, and apply them to the simplest models arising from the above mentioned fields.

5. **Credit Hours:** Three

6. **Pre-requisites:** MATH 2121,Calculus III and MATH 3301, Differential Equations

7. **Syllabus:** Attached

8. **Similarity to or duplication of Existing Courses:** N/A

9. **Textbook selection:** 1. D. Zill and M. Cullen, "Advanced Engineering Mathematics", Jones and Bartlett, 3rd edition, (2006) [ISBN–13: 9780763745912, ISBN–10: 076374591X]
2. Richard Haberman, ``Applied partial differential equations: with Fourier series and boundary value problems", Pearson Prentice Hall, 4th edition.[ISBN-13: 9780130652430]
3. Matlab references.

10. **Grading:** See details in the attached syllabus

Savannah State University
MATH 4301: Survey of Partial Differential Equations.

Name and Title of the Instructor: TBA

Class Room Location: TBA

Meeting Times: TBA

Office Location/Office Hours: TBA
Office Telephone/E-mail:

Course Description:
The course provides an overview of Fourier series. It also provides an introduction to some elementary partial differential equations. A number of applications to actual problems will be discussed. Students will also further develop their programming skills in MATLAB, and will use them to solve a range of problems introduced during lectures.

Credit Hours:
3 credit hours

Prerequisites:
MATH 3301, Differential Equations
Course Objectives:
By the end of the course students should be familiar with the basic theory concerning Fourier series, as well as partial differential equations, and should be able to apply this theory to solve problems arising in applications. They should also be able to develop MATLAB programs for the solution and visualization of such.

Expected Student Learning Outcomes:
Upon successful culmination of this course, students should be able to do the following:
1. *Understand properties of Orthogonal functions*
2. *Find the Fourier series of a function*
3. *Solve partial differential equations using the method of separable of variables*
4. *Solve boundary value problems*
5. *Solve the heat equation, wave equation, and the Laplace's Equation.*
6. *Solve nonhomogeneous boundary value problems with the method of eigenfunction expansion*

Core Competencies:
MATH 4301 addresses the following core competencies which are measured by the methods listed below the competency.

1st Core Competency: *Mathematics*
Measured by: *Performance on course examinations and homework assignments, which require the use of algebra and differential calculus*

2nd Core Competency: *Critical Thinking*

Measured by: *Performance on course homework, examinations, solving problems that arises from applications that require analysis and interpretation..*

3rd Core Competency: *Technology*
Measured by: *Performance on course homework and Lab project using MATLAB.*

Required Text and Supplemental Readings:
Required Text: *None*
References:
1. *D. Zill and M. Cullen, "Advanced Engineering Mathematics", Jones and Bartlett, 3rd edition, (2006) [ISBN–13: 9780763745912, ISBN–10: 076374591X]*
2. *Richard Haberman, ``Applied partial differential equations: with Fourier series and boundary value problems", Pearson Prentice Hall, 4th edition.[ISBN-13: 9780130652430]*
3. *Matlab references.*

Course Requirements and Methods of Assessment:
1. ***Homework:*** *Homework will be assigned every two weeks. Homework is an important component of the course.*
2. ***Lab Projects****: During lab sessions you will work on a computer project that involves some analysis and calculations using the software package* ***MATLAB***
3. ***Tests:*** *Two tests will be administered during the semester.*
4. ***Examinations****: There will be one midterm exam and a final exam.*

Course Grades:

Homework	20%
Computer Lab	10%
Two Tests	20%
Mid-Term Exam	25%
Final Exam	25%

Methods of Instruction:
Lecture, problem solving sessions, and discussion are the primary means of instructing students in this course.
Laboratory:
The lab hours will be utilized for solving problems with MATLAB

Grading Policy:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
< OR = 59	F

Class and Lab Attendance Policy:

***SSU Policy*:**

Savannah State University endeavors to provide optimum conditions for the intellectual growth and development of its students. With the exception of University approved activities, it is expected that students should attend and be punctual to their classes, laboratories, and officially scheduled class requirements. Students who are absent because of participation in approved University activities will be permitted to make up work missed during their absences, provided that no more than 15% of class hours per course per term are missed and that work is assigned for completion prior to the University sanctioned activity.

All matters related to student absences, including the making up of work missed, are to be arranged between the student and the instructor. Instructors will publish their guidelines for handling absences in their syllabi. Students are obligated to adhere to the requirements of each course. Faculty are encouraged to take into consideration religious holidays of the student's faith, summons, jury duty, or similar compelling reasons for absences.

Academic Honesty Policy:

Academic honesty will be enforced according to the policy in the handbook. Refer to Student Affairs: Academic Irregularity

Statement on Disabilities:

Savannah State University is committed to providing reasonable accommodations to students with documented disabilities, as required under federal law. The purpose of disability accommodation is to provide equal access to the academic material and equal access to demonstrate mastery of the material. Students with disabilities must meet all the academic requirements and standards of the class, including the attendance policy. If you have a disability and need accommodations, please contact Amelia Castilian-Moore, Coordinator of Disability Services at 912 358 3115 or moorea@savannahstate.edu. The Office of Counseling and Disability Services is located in King Frazier 233. You will need to meet with Ms. Castilian-Moore, who can help you gather documentation of your disability or refer you to an appropriate resource for assessment. Once documentation of the disability is gathered and approved, Ms. Castilian-Moore will provide you with an Accommodation Letter, detailing the appropriate, approved accommodations, which you should present to me so we can discuss and implement your accommodations.

Course Schedule:

1. Orthogonal Functions and Fourier Series
Orthogonal Functions
Fourier Series
Fourier Cosine and Sine Series
Complex Fourier Series
Orthogonal Functions
2. The Method of Separation of Variables
Introduction
Time-Dependent Equations
Boundary Value Problems
Eigenvalues and Eigenfunctions
Product solutions and the Principle of Superposition
3. Heat Equation

Introduction
Derivation of the Heat Equation in One Dimension
Boundary Conditions
Equilibrium Temperature Distribution
Derivation of the Heat Equation in Two or Three Dimensions
4. Wave Equation
Derivation of the Wave Equation in One Dimension
Boundary Conditions
Vibrating String with Fixed Ends
5. Laplace's Equation,
Solution of Laplace's Equation on a rectangle and on a Circular disk
Qualitative Properties of Laplace's Equation
6. Nonhomogeneous Boundary Value Problems
Heat Flow with Sources and Nonhomogeneous Boundary Conditions
Method of Eigenfunction Expansion
7. Higher Dimensional Partial Differential Equations
The two- dimensional wave equations
The Two-dimensional heat equation