PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

DIFFERENTIAL EQUATIONS
MATH 2120

Class Hours: 3.0   **Credit Hours: 3.0**

Laboratory Hours: 0.0   **Date Revised: Fall 2011**

Catalog Course Description:

A first course in differential equations emphasizing solution techniques. Includes first-order
equations and applications, theory of linear equations, basic second-order equations and applications,
Laplace transforms, and series solutions.

Entry Level Standards:

Proficiency in the evaluation and application of both differentiation and integration of algebraic,
trigonometric, exponential, and logarithmic functions is necessary for entrance to this course.

Prerequisites:

MATH 1920

Co-requisites:

None

Textbook(s) and Other Course Materials:

Textbook:
Nagle, R. Kent, Edward B. Saff and Arthur D. Snider; Fundamentals of Differential Equations; 8th
ed. Pearson/Addison-Wesley, Inc.; 2011.
References:
Zill, Dennis G. Differential Equations with Computer Lab Experiments. Brooks/Cole Pub. Co., 1998.

Farlow, Stanley J. Differential Equations and Their Applications. McGraw-Hill, Inc., 1994.

Edwards, Henry, David E. Penney, David Penney, and David Calvis. Differential Equations--
Computing and Modeling. Prentice-Hall, 2007.

Personal Equipment:
A graphing calculator is required. The TI-84 or TI-84 Plus is recommended.

I. Week/Unit/Topic Basis:

Week	Topic
1	Definitions and Terminology, Initial-value Problems, Direction Fields; 1.1-1.3
2	Euler's Method, Phase Portraits, Introduction to Motion of a Falling Body, Separable Equations; 1.4, 2.1-2.2
3	Linear Equations, Exact Equations, Substitutions and Transformations; 2.3, 2.4, 2.6

4	Compartmental Analysis; 3.2
5	Heating and Cooling, Newtonian Mechanics; 3.3, 3.4
6	Improved Euler's Method; 3.6
7	Homogeneous Linear Equations with Constant Coefficients, Auxiliary Equations with Complex Roots, Method of Undetermined Coefficients; 4.2 – 4.4
8	Superposition and Nonhomogeneous Equations Variation of Parameters, Reduction of Order; 4.5 - 4.7
9	Interconnected Fluid Tanks, Elimination Method for Systems; 5.1, 5.2
10	Definition of Laplace Transform; 7.2
11	Properties of The Laplace Transform, Inverse Laplace Transform, Solving Initial Value Problems; 7.3 – 7.5
12	Laplace Transforms and Special Functions; 7.6
13	Power Series, Analytic Functions, and the Taylor Series Method, Power Series Solutions to Linear Differential Equations; 8.1 – 8.3
14	Review for Last Chapter Test and Final Exam
15	Final Exam

II. Course Goals*:

The course will

A. The course will provide a working knowledge of first- and second-order differential equations and their solutions. VI.2,3,4,5,6

B. Apply the concepts of differential equations to suitable mathematical models. VI.2,3,4,5,6

C. Scrutinize solution techniques comparatively (graphical, numerical, symbolic, transforms, etc.). VI.2,3,4,5,6

*Roman numerals after course objectives reference goals of the Mathematics program (Career Program Goals and General Education Goals are listed
http://www.pstcc.edu/departments/curriculum_and_instruction/syllabi/)

III. Expected Student Learning Outcomes*:

Students will be able to:

Solve "separable", "exact", "integrating factor" and "Bernoulli" first order differential equations symbolically. A

Apply first order differential equations solution techniques to mathematical models (including: population, heating/cooling, compartmental analysis, Newtonian mechanics, terminal velocity, and logistic models). B

Define the numerical solutions (Euler's Method) to first order differential equations. C

Illustrate familiarity with graphical solutions to first order differential equations using direction fields. C

Determine the best method (graphically, numerically, or symbolically) of solving first order differential equations. C

Calculate general and particular solutions to second order linear homogeneous and nonhomogeneous equations with constant coefficients (using "auxiliary equations", "undetermined coefficients" and "variation of parameters" techniques). A

Apply second order differential equation solution techniques to mathematical models (including compartmental, mechanical vibration, spring and pendulum models) B

Analyze the behavior of the second order solutions for ordinary differential equations. A

Use Laplace transforms and translation theorems to find differential equation solutions. A

Find solutions to systems of differential equations using Laplace transforms. A

Determine series solutions (Taylor and power series) to differential equations. A

* Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

IV. Evaluation:

A. Testing Procedures:

Students are evaluated primarily on the basis of tests, quizzes, homework, and the comprehensive final exam. A minimum of 4 major tests and the comprehensive exam is recommended.

B. Laboratory Expectations:

NA

C. Field Work:

NA

D. Other Evaluation Methods:

NA

E. Grading Scale:

93	-	100	A
88	-	92	B+
83	-	87	B
78	-	82	C+
70	-	77	C
60	-	69	D
Below 60			F

V. Policies:

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of the Learning Division, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of the Learning Division.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:
• Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
• Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
• Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
• Taking an exam for another student.
• Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
• Any of the above occurring within the Web or distance learning environment.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at www.pstcc.edu/departments/swd/.

D. Other Policies:

Make-up work: Instructor discretion about make-up tests and/or assignments.

Cell phones: Cell phones are to be either turned off or put on vibration mode while in class. Instructor discretion as to penalty.