**Miami-Dade Community College**
**MAP 2302 Introduction to Differential Equations.**

Course Description: Topics include: Equations of first order; linear equations with constant coefficients; non-homogeneous equations; variation of parameters; solution using Laplace Transforms; elementary existence theorems; series solutions; applications. (3 hrs. lecture)

Pre-requisite: MAC 2312 with a grade of C or better or equivalent.

Course Competencies:

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| Competency 1: | The Student will identify, and classify,<br>a. Ordinary differential equations (ODE) by order and linearity.<br>b. First order ODE as separable, exact, linear, homogeneous or Bernoulli.<br>c. Higher order ODE as homogeneous or nonhomogeneous. |
| Competency 2: | The Student will establish the analogies and differences between<br>a. Solution of an ODE,<br>b. Particular solution,<br>c. General solution,<br>d. N-Parameter family of solutions. |
| Competency 3: | The Student will construct ODE models and solve them in situations such as,<br>a. Elementary population dynamic<br>b. Mixture problems<br>c. Harmonic oscillator (free undamped, free damped, and forced motion) |
| Competency 4: | The Student will demonstrate knowledge of the initial value problem (IVP) and boundary value problems (BVP) by,<br>a. Recognizing initial value problems,<br>b. Recognizing boundary value problems,<br>c. Applying the Existence and Uniqueness Theorem for first-order IVP,<br>d. Applying the Existence and Uniqueness Theorem for an n-th order IVP for linear equations,<br>e. Recognizing that Existence and Uniqueness Theorem does not apply to BVP. |

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| Competency 5: | The Student will demonstrate proficiency-obtaining solutions of ODE by,<br>a. Solving first order ODE of various types (separable, exact, linear, homogeneous, and Bernoulli),<br>b. Solving second order ODE applying the reduction of order method,<br>c. Higher order linear ODE with constant coefficients applying the annihilator approach and variation of parameters<br>d. Second order ODE with polynomials coefficients applying series solutions. |
| Competency 6: | The Student will demonstrate knowledge of the Laplace Transform method by,<br>a. Solving IVP for linear ODE with constant coefficients,<br>b. Solving integral and integrodifferential equations. |