ROCHESTER COMMUNITY AND TECHNICAL COLLEGE COMMON COURSE OUTLINE

Course discipline/number/title: MATH 2238: Differential Equations and Linear Algebra

A. CATALOG DESCRIPTION
1. Credits: 5
2. Hours/Week: 5
3. Prerequisites (Course discipline/number): MATH 1128
4. Other requirements: None
5. MnTC Goals (if any): NA

B. COURSE DESCRIPTION: This course is an in-depth look at topics such as ordinary differential equations, vector spaces, systems, linear transformations, and applications. College level reading skills as demonstrated by completion of READ 0900 or equivalent placement score.

C. DATE LAST REVISED (Month, year): February, 2020

D. OUTLINE OF MAJOR CONTENT AREAS:
1. Differential Equations
   a) First Order Ordinary Differential Equations (ODE)
   b) Higher Order Linear ODE
   c) Qualitative and Quantitative Systems of Linear ODE
   d) Laplace Transforms
   e) Power Series Methods
2. Linear Algebra
   a) Systems and Homogeneous Systems
   b) Vector Spaces, Subspaces, Fundamental Subspaces, Inner Products, and Basis
   c) Linear Transformations and Matrix Representation
   d) Eigenvalues, Eigenvectors, Similarity, Diagonalization
   e) Gram-Schmidt Orthogonalization Process and Applications to Fourier Analysis

E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Differential Equations
   a) Solve first order ordinary differential equations (ODE).
   b) Solve higher order linear constant coefficient ODE.
   c) Analyze systems of first order ODE quantitatively and qualitatively.
   d) Solve ODE and Systems of ODE via Laplace Transforms.
   e) Solve ODE by Power Series and Frobenius Series methods.
2. Linear Algebra
   a) Solve Homogenous and Non-Homogenous Linear Systems by Matrix Methods.
   b) Verify the conditions for Vector Spaces, Spans, Linear Independence, and Basis definitions.
   c) Create an orthonormal basis for a finite dimensional space by the Gram-Schmidt Algorithm.
   d) Compute Eigenvalues, Eigenvectors, and Generalized Eigenvectors.
   e) Verify a transformation is Linear and find its matrix representation.

F. LEARNING OUTCOMES (MNTC): NA

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Exams
2. Homework
3. Quizzes
4. Projects
5. Comprehensive Final Exam

H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.

I. SPECIAL INFORMATION (if any): None