



# North Central Michigan College

## Master Course Syllabus

### PART 1:

Course Name: Differential Equations

Course Number: MATH 225

Credit Hrs. 3

Lecture Hrs. 3

Lab Hrs. 0

Clinical Hrs. 0

Variable Hrs. 0

Total Hours of Instruction: 3

Total Contact Hours: 52.8

*(Total Contact hour's formula: (lecture hrs. + lab hrs. + clinical hrs.) x 17.6)*

#### Course Description:

A course in solving first and second order differential equations with some attention to the nth order equation with constant coefficients. Emphasis is on equations that have applications in the physical sciences and engineering. Topics in differential equations include: linear, separable, homogeneous and exact equations, systems of differential equations, solutions by series, numerical methods, and the Laplace transform. Use of graphing calculators and current technology are emphasized.

Prerequisite (s): MATH 210 (or equivalent) with a grade of "C" or higher.

Co-requisite (s): None

#### Course Objectives:

Upon completion of this course, successful students will be able to:

- Recognize and solve elementary ordinary differential equations (ODE's).
- Classify ODE's by order and degree.
- Solve linear systems using matrix methods.
- Solve ODE's utilizing a systems approach.
- Use a homogeneous equation to solve the more general initial value problem and boundary value problems
- Use the Laplace transform in problem solving.

Reasonable accommodations can be provided for students with documented disabilities. Please contact Learning Support Services to arrange for these (231)348-6687 or (231)348-6817, Room 533 SCRC.



# North Central Michigan College Master Course Syllabus

## PART 2:

### Course Objectives and Linked Lumina DQP Outcomes

See **PART 3** of this syllabus for the complete language of each Lumina DQP outcome.

*Please identify the Lumina DQP outcome(s) supported by the course objectives. List each course objectives (from **PART 1**), followed by the corresponding Lumina DQP Outcome number(s) in parentheses.*

- Recognize and solve elementary ordinary differential equations (ODE's). (DQP 2,10,13)
- Classify ODE's by order and degree. (DQP 2,10,13)
- Solve linear systems using matrix methods. (DQP 2,10,13)
- Solve ODE's utilizing a systems approach. (DQP 2,10,13)
- Use a homogeneous equation to solve the more general initial value problem and boundary value problems. (DQP 2,10,13)
- Use the Laplace transform in problem solving. (DQP 2,10,13)



# North Central Michigan College Master Course Syllabus

## **Suggested Methods of Instruction:**

Lecture, discussion, collaborative group work, and assignments.

## **Suggested Methods of Assessment and Evaluation:**

Tests and final examination – Homework and participation – Projects and collaborative classroom work.

## **Adopted Text at Time of Course Adoption/Revision:**

A First Course in Differential Equations, Dennis Zill, Thompson Publishers

## **Topics Covered During the Semester:**

*Sequence of topics and time allowance are at the discretion of the instructor*

- Week 1: Introduction to Differential Equations & Modeling
- Week 2: Introduction to Differential Equations & Modeling
- Week 3: First Order Differential Equations
- Week 4: First Order Differential Equations
- Week 5: First Order Differential Equations
- Week 6: Modeling With First Order Differential Equations
- Week 7: Modeling With First Order Differential Equations
- Week 8: Differential Equations of Higher Order
- Week 9: Differential Equations of Higher Order
- Week 10: Modeling With Higher Order Differential Equations
- Week 11: Modeling With Higher Order Differential Equations
- Week 12: Modeling With Higher Order Differential Equations
- Week 13: The Laplace Transform
- Week 14: The Laplace Transform
- Week 15: The Laplace Transform s
- Week 16: Series Solution of Linear Equations

Part 1 & Part 2 approved by CRDAP on: 04 17 15

Part 2 approved by AD:

Date:

Part 2 approved by CRDAP Chair:

Date:

Rev02/15



# North Central Michigan College

## Master Course Syllabus

### **PART 3:**

**LUMINA DQP OUTCOMES** – Use this reference sheet for **PART 2** of Master Course Syllabus.

#### **Specialized Knowledge**

1. Describes the scope and principal features of the field of study, citing at least some of its core theories and practices, and offers a similar explication of at least one related field.
2. Illustrates contemporary terminology used in the field.
3. Generates substantially error-free products, reconstructions, data, juried exhibits or performances as appropriate to the field.

#### **Broad Integrative Knowledge**

4. Describes how existing knowledge or practice is advanced, tested and revised
5. Describes and examines a range of perspectives on key debates and their significance both within the field and in society.
6. Illustrates core concepts of the field while executing analytical, practical or creative tasks.
7. Selects and applies recognized methods of the field in interpreting characteristic discipline-based problems.
8. Assembles evidence relevant to characteristic problems in the field, describes the significance of the evidence, and uses the evidence in analysis of these problems.
9. Describes the ways in which at least two disciplines define, address and interpret the importance of a contemporary challenge or problem in science, the arts, society, human services, economic life or technology.

#### **Intellectual Skills – Analytic Inquiry**

10. Identifies, categorizes and distinguishes among elements of ideas, concepts, theories and/or practical approaches to standard problems.

#### **Intellectual Skills – Use of Information Resources**

11. Identifies, categorizes, evaluates and cites multiple information resources necessary to engage in projects, papers or performance in his or her program.

#### **Intellectual Skills – Engaging Diverse Perspectives**

12. Describes how knowledge from different cultural perspectives would affect his or her interpretations of prominent problems in politics, society, the arts and/or global relations.

#### **Intellectual Skills – Communication Fluency**

13. Presents accurate calculations and symbolic operations, and explains how such calculations and operations are used in either his or her specific field of study or in interpreting social and economic trends.
14. Presents substantially error-free prose in both argumentative and narrative forms to general and specialized audiences.

#### **Applied Learning**

15. Describes in writing at least one substantial case in which knowledge and skills acquired in academic settings are applied to a challenge in a non-academic setting; applies that learning to the question; and analyzes at least one significant concept or method related to his or her course of study in light of learning outside the classroom.
16. Locates, gathers and organizes evidence on an assigned research topic addressing a course-related question or a question of practice in a work or community setting; offers and examines competing hypotheses in answering the question.

#### **Civic Learning**

17. Describes his or her own civic and cultural background, including its origins and development, assumptions, and predispositions.
18. Describes diverse positions, historical and contemporary, on selected democratic values or practices, and presents his or her own position on a specific problem where one or more of these values or practices are involved.
19. Takes an active role in a community context (work, service, co-curricular activities, etc.), and examines the civic issues encountered and the insights gained from the community experience.

The Degree Qualifications Profile was adopted by CRDAP: April 11, 2012