Marietta City Schools

2023–2024 District Unit Planner

AP Calculus BC

Unit title	**MHS Unit 9** **AP Unit 7: Differential Equations**	**Unit duration (hours)**	**3 weeks**

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

7.1 Modeling situations with differential equations
7.2 Verifying solutions for differential equations
7.3 Sketching slope fields
7.4 Reasoning using slope fields
7.5 Approximating solutions using Euler's method
7.6 Finding general solutions using separation of variables
7.7 FInding particular solutions using initial conditions and separation of variables
7.8 Exponential models with differential equations
7.9 Logistic models with differential equations

Concepts/Skills to support mastery of standards

- Modeling situations with differential equations
- Verifying solutions for differential equations
- Sketching slope fields
- Reasoning using slope fields
- Approximating solutions using Euler's method
- Finding general solutions using separation of variables
- Finding particular solutions using initial conditions and separation of variables
- Exponential models with differential equations
- Logistic models with differential equations

Vocabulary

Separable differential equations

Slope fields

General solutions

Exponential growth

Logistic growth

Euler's method

Tangent line approximations

Carrying capacity

Notation

$F(x) = y_0 + \int_a^x f(t)\,dt$

$\frac{dy}{dt} = ky, \quad y = y_0 e^{kt}$

$\frac{dy}{dt} = ky(a - y)$

Essential Questions

How can you set up and solve separable differential equations?
How are slope fields used to represent solution curves to differential equations?
How are differential equations related to exponential growth, exponential decay and logistic growth curves?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s):

Notebook, HW quizzes, AP Classroom Progress Checks

Summative Assessment(s):

Unit Test - Differential equations (APCalc BC topic 7)

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
7.1 Modeling situations with differential equations 7.2 Verifying solutions for differential equations	Mixed Six activity for Modeling with Differential Equations (7.1-7.2) 1. Factual recall 2. Carry out a procedure 3. Classify a mathematical object 4. Prove, show, justify 5. Extend a concept 6. Critique a fallacy	Collaborative groups Technology: desmos, graphing calculators, if desired.
7.6 Finding general solutions using separation of variables 7.7 Finding particular solutions using initial conditions and separation of variables	Mixed Six activity for Modeling with Differential Equations (7.6-7.7) 1. Factual recall 2. Carry out a procedure 3. Classify a mathematical object 4. Prove, show, justify 5. Extend a concept 6. Critique a fallacy	Collaborative groups Technology: desmos, graphing calculators, if desired.

Content Resources

- AP Classroom (within AP Central, collegeboard.org), AP daily videos, progress checks
- Calculus textbook: Calculus, 11e, Larson & Edwards
- Tony Record (Avon HS) created resources
- Khan Academy
- Delta Math

- Flippedmath.com
- Master Math Mentor (pdf files and videos)
- Interactive NB pages
- Teacher created resources