



## Course Number and Title: MAT 291 Ordinary Differential Equations

**Campus Location:**

Georgetown, Dover, Stanton

**Effective Date:**

2018-51

**Prerequisite:**

MAT 282 or MAT 283

**Co-Requisites:**

None

**Course Credits and Hours:**

4.00 credits

4.00 lecture hours/week

1.00 lab hours/week

**Course Description:**

This course examines solutions of ordinary differential equations of first and second order using qualitative, numeric, and analytic approaches. Mathematical modeling of real-life phenomena is studied.

**Required Text(s):**

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore.

Check your course schedule for the course number and section.

**Additional Materials:**

TI-84 Graphing Calculator

**Schedule Type:**

Classroom Course

**Disclaimer:**

None

**Core Course Performance Objectives (CCPOs):**

1. Determine characteristics of ordinary differential equations. (CCC 2, 6)
2. Solve ordinary differential equations. (CCC 2, 6)
3. Solve systems of differential equations. (CCC 2, 6)
4. Estimate solutions using numerical methods. (CCC 2, 6)
5. Solve applications using differential equations. (CCC 2, 6)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

**Measurable Performance Objectives (MPOs):**

Upon completion of this course, the student will:

1. Determine characteristics of ordinary differential equations.
  1. Determine order and linearity of ordinary differential equations.
  2. Determine if a given function is a solution of a differential equation.
  3. Determine linear independence or dependence using the Wronskian.
2. Solve ordinary differential equations.
  1. Solve differential equations using separation of variables or integrating factors.
  2. Solve exact differential equations.
  3. Solve initial-value differential equations.
  4. Solve differential equations using characteristic polynomials.
  5. Solve non-homogenous differential equations using undetermined coefficients and variation of parameters.
  6. Solve differential equations using Laplace transforms.
  7. Solve differential equations using power series.
3. Solve systems of differential equations.
  1. Calculate eigenvalues and eigenvectors of a matrix.
  2. Solve first order linear systems with constant coefficients that have real eigenvalues, complex eigenvalues, or repeated eigenvalues.
4. Estimate solutions using numerical methods.
  1. Use Euler's method and improved Euler's method to estimate solutions.
  2. Use Runge-Kutta's method to estimate solutions.
5. Solve applications using differential equations.
  1. Solve growth and decay models.
  2. Solve physics applications.

**Evaluation Criteria/Policies:**

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**

None

**Disabilities Support Statement:**

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.