

CONCORDIA UNIVERSITY
FACULTY OF ENGINEERING AND COMPUTER SCIENCE
APPLIED ORDINARY DIFFERENTIAL EQUATIONS
ENGR 213 - FALL 2015

Course Description: This course introduces first year engineering students to the theory and application of ordinary differential equations. Definition and Terminology, Initial-Value Problems, Separable Differential Equations, Linear Equations, Exact Equations, Solutions by Substitution, Linear Models Orthogonal Trajectories, Complex Numbers, Form of Complex Numbers: Powers and Roots, Preliminary Theory: Linear Equations, Homogeneous Linear Equations with Constant Coefficients, Undetermined Coefficients, Variation of Parameters, Cauchy-Euler Equation, Reduction of Order, Linear Models: Initial Value, Review of Power Series, Power Series Solutions, Preliminary Theory, Homogeneous Linear Systems, Solution by Diagonalisation, Non-Homogeneous Linear Systems.

Lectures: three hours per week. Tutorial: two hours per week. NOTE: Students who have received credit for EMAT 212 and 232 may not take this course for credit. (Prerequisite: MATH 204 (cégep Mathematics 105) previously or concurrently; MATH 205 (cégep Mathematics 203)).

Textbook: Advanced Engineering Mathematics, by Dennis G. Zill and Warren S. Wright, 5th Edition, Published by Jones and Bartlett, 2014.

Grading Scheme:

Midterm exams	20%, 10% each (during the tutorial)
Assignments	10% (handed in and returned during the tutorial)
Final exam	70%

If the grade of the final exam is better than the combined mark of the two mid-term examinations, then it will carry 90% of the final grade. If the student misses a mid-term test for any reason, including illness, then the final examination will count for 90% of the final grade. Students are responsible for finding out the date of the final exam. The Examination Office posts the time and place of the final exam once the schedule becomes available. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office. Students are expected to be available until the end of the final examination period. Conflicts due to travel plans will not be accommodated.

YOU MUST PASS THE FINAL EXAM TO PASS THE COURSE

PLEASE NOTE: Electronic communication devices (including cellphones) will not be allowed in examination rooms. Only "Faculty Approved Calculators" will be allowed in examination rooms [SHARP EL-531 or CASIO FX-300MS]

Sections Topics

- 1.1 Definition and Terminology
- 1.2 Initial Value Problems
- 2.2 Separable Equations
- 2.3 Linear Equations

- 2.4 Exact Equations
- 2.5 Solutions by Substitution
- 2.7 Linear Models (Growth and Decay, Newton's Law of Cooling)
- 17.1 Complex Numbers
- 17.2 Powers and Roots
- 3.1 Theory of Linear Equations
- 3.3 Homogeneous Linear Equations with Constant Coefficients
- 3.4 Undetermined Coefficients
- 3.5 Variation of Parameters
- 3.6 Cauchy Euler Equations
- 3.7 Nonlinear Equations, Reduction of Order (Examples 1, 2)
- 3.8 Linear Models. Initial Value Problems (Examples 1, 3, 4, 5, 6, 7, 8)
- 3.9 Linear Models. Boundary Value Problems
- 5.1.1 Review of Power Series (begin)
- 5.1.1 Review of Power Series (only radius of convergence)
- 5.1.2 Power Series Solutions
- 10.1 Theory of Linear Systems
- 10.2 Homogeneous Linear Systems
- 10.3 Solution by Digitalization
- 10.4 Non-Homogeneous Linear Systems
- 10.5 Matrix Exponential

Assignments

Assignment 1

Section 1.1: exercises: 1,2,3,5,6,8,10,11,13,14,21,23,24 Section 1.2: exercises: 7,9,11,12,17,18.
Section 1.3 exercises: 10, 13.

Assignment 2

Section 2.1: exercises: 3, 4, 26, 27. Section 2.2: exercises: 23, 25, 26. Section 2.3: exercises: 19, 22, 23.

Assignment 3

Section 2.4: exercises: 1, 8, 16, 17, 19, 22, 23. Section 2.5: exercises: 1, 8, 16, 17, 19, 22, 23.

Assignment 4

Section 2.7: exercises 13, 17. Section 2.8: exercises 15, 16, 22.

Assignment 5

Section 3.1 exercises: 1,23,31,34. Section 3.2 exercises: 1, 2,4,17.

Assignment 6

Section 3.3 exercises: 1,2,4,29,31,34,38,41.

Assignment 7

Section 3.4 exercises: 1, 2, 29,31. Section 3.5 exercises: 1,4,22. Section 3.6 exercises: 1,2,4,5,

Assignment 8

Section 3.8 exercises: 1,6, 11, 12, 13.

Assignment 9

Section 5.1 exercises: 17,18, 20,27. Section 6.1 exercises: 1, 2

Assignment 10

Section 10.1: exercises: 5,16,25 Section 10.2: exercises: 2,13,23,37

Assignment 11

Section 10.3: exercises: 2,4 Section 10.4: exercise: 5

