American University of Beirut
Department of Mathematics
Math 202: Differential Equations (Spring 2017-18)

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Office hours: TBA weekly by Moodle (like T 1:00 –4:00 OR Th 1:00 –4:00)

Lecture meetings: 2MWF in Chem 001 ---and ---- 3MWF in SLH (Zaabiri Hall)
Go to YOUR Recitation (or any but same Recitation)

Textbooks:
Thomas' Calculus, 13th edition by Thomas, Weir, and Hass.
A First Course in Differential Equations with Modeling Applications, 10thed by Dennis G. Zill.

Description of the Course
The course will be centered around several main topics covering the notion of solution differential equation, linear and non-linear differential equations, initial and boundary-value problems, series solutions, Laplace transform and systems. At the beginning, a small part of the course will be devoted to the study of surface integrals and Stokes' theorem.

Topics covered
Surface integrals, Stoke's theorem, divergence theorem, first-order differential equations, linear differential equations, series solutions, Bessel's functions, Laplace transform, systems of linear differential equations.

Course Learning Outcomes

At the end of the course, students will have:

- Ability to use Calculus methods to integrate a differential equation.
- Ability to use infinite series methods, to solve a differential equation.
- Ability to use extended infinite series methods (Frobenius) to solve a differential equation.
- Ability to use linear algebra methods (eigenvalues, eigenvectors of a matrix) to solve a system of differential equations.
- Ability to use transform methods (Laplace transform) to solve a differential equation.
- Ability to combine transform methods and linear algebra methods to solve a system of differential equations.
- Ability to use the divergence and Stokes' theorems in the calculation of volumes and surface areas in three dimensions. …..ETC

AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temp. medical conditions , and in order to help establish reasonable accommodations and facilitate smooth accommodations process, you are encouraged to contact the Accessible Education Office in West Hall 314.

Section	**Assigned homework problems**
Thomas' Calculus 13th edition by Thomas, Weir, and Hass.	
16.1 Line Integrals	1-9, 11, 13, 15, 16, 17, 19, 21, 23, 25, 26, 27, 28
16.2 Vector fields	1, 3, 4, 5, 7, 9, 13, 15, 17, 19, 23, 25, 29, 33, 37
16.3 Path independence	3, 5, 6, 7, 9, 12 - 22, 25, 28, 31, 33

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Thomas' Calculus 13th edition by Thomas, Weir, and Hass.

16.1 Line Integrals 1-9, 11, 13, 15, 16, 17, 19, 21, 23, 25, 26, 27, 28
16.2 Vector fields 1, 3, 4, 5, 7, 9, 13, 15, 17, 19, 23, 25, 29, 33, 37
16.3 Path independence 3, 5, 6, 7, 9, 12 - 22, 25, 28, 31, 33
16.4 Green's theorem 1-5,7, 8, 9, 17, 19, 21, 23, 24, 26
16.5 Surface area 1, 3, 5,13,14,15,17,20,23
16.6 Surface integrals 17,19,21,23,25,27,29,31,33,35,37
16.7 Stokes' theorem 1, 3, 5, 6,7,9,13,15, 17
16.8 Divergence theorem 5, 9, 11, 13, 15

A First Course in Differential Equations with Modeling Applications

1.1 Definitions 2, 3, 12, 13, 16, 17, 20, 22, 23, 25, 26, 27, 29, 37, 43, 56, 58
1.2 Initial value problems 1, 3, 6, 7, 9, 12, 15, 17, 19, 20, 22, 24, 29, 30

Exam 1 (25% of course grade) Saturday, February 24, 4:00 pm

2.2 Separable equations 3, 7, 8, 12, 14, 15, 17, 20, 22, 24, 26, 28, 30
2.3 Linear Equations 3, 7, 10, 15, 16, 19, 20, 22, 24, 26, 28, 31,33, 37
2.4 Exact equations 2, 3, 8, 9, 11, 12, 17, 18, 2, 22, 25-34, 38, 42(a),43
2.5 Solutions by substitutions 1, 8, 9, 13, 15, 16, 17, 20, 25, 26, 29, 30, 33, 35,36
4.1 Linear equations 2,3,5,7, 9, 10, 12,13, 15,17,18 19, 20,25, 28, 31, 32, 35,38,39
4.2 Reduction of order 1, 4, 5, 8, 9, 11, 13, 17, 19, 20
4.3 Homogeneous equations 8,16,17,20,22,23,26,27,30,31,32,34,36,38,42,49,50,51,59,60
4.4 Undetermined coefficients 1, 5, 10, 15, 19, 21. 22, 25, 30, 35, 37, 38, 39,41
4.6 Variation of parameters 1,2,3, 6, 9,13-15, 21-24, 26,28
4.7 Cauchy-Euler equations 4,7,11, 14, 15, 17, 20, 22,26, 28, 30, 32,33, 34,35,36,37
6.1 Power series 5, 6, 8, 12, 14, 15, 16, 18, 19, 23, 24, 25, 27, 30, 31, 36, 37

Exam 2 (25% of course grade) Saturday, March 24, 4:00 pm

6.2 Solutions about ordinary points 4, 5, 7, 10, 15, 19, 22, 23, 24, 26, 27, 28
6.3 Solutions about singular points 1, 2,3, 6, 7, 9, 11, 12, 14, 15,16,18,23,30,31,32
6.4 Bessel's functions 1,3,6,9,11,13-18,22,23,24
7.1 Laplace Transform 1, 5,12,14,15, 16, 17,18, 23, 26, 27,28, 29, 32,33,34,35, 38,40
7.2 Inverse Transform 3,4, 9, 13, 15, 17, 20, 24, 29,30, 31, 32, 34, 35, 36,39, 40
7.3 Operational properties 5,8,10,15,18,19,21,25,30,31,38,39,41,45,47,48, 49,50,51,53,56,59,63,67,70,
7.4 Operational properties II 4, 6, 9, 11, 13, 19, 21, 25, 26, 28, 29, 31, 32, 33, 38, 40, 45, 46,49.52,53,59,60
7.5 Dirac delta 1-12
7.6 Systems of linear equations 1, 2, 5, 7, 9, 10, 12
Appendix II 1, 3, 8, 9, 13, 15, 19, 23, 27, 34, 38, 39, 47, 49, 51, 53, 55
8.1 Linear systems 1, 2, 6, 7, 13, 25
8.2 Homogeneous systems (Eigenvalue method) 1, 2, 3, 4, 5, 6, 9, 13, 23, 25, 33, 34, 35, 39, 41, 42, 44, 45
8.3 Non homogeneous systems 2, 4, 6, 8

Final Exam (50% of course grade) comprehensive TBA