

Math 202 — Spring 2023
Differential Equations, Lecture 2, Sections 5–8
Professor's website: <https://sites.aub.edu.lb/kmakdisi/>

Professor: Kamal Khuri-Makdisi, Bliss 311, phone 4234. E-mail to kmakdisi@aub.edu.lb is usually the easiest way to contact me. My **office hours** are TTh 3–5pm. Announcements and supplementary material for the course will be posted on Moodle.

Lectures: TTh 9:30–10:45am, in Bliss 203.

Recitations: with Ms. Joumana Tannous:

Section 5, F 12–12:50pm, Nicely 325;

Section 6, F 3–3:50pm, Nicely 206;

Section 7, F 1–1:50pm, Nicely 327;

Section 8, F 5–5:50pm, Nicely 318.

Make sure you know which section you are registered for. We will take attendance in recitation for part of your course grade.

Textbooks: [Z] D. Zill, *A First Course in Differential Equations with Modeling Applications*, 10th edition, and [T] Thomas/Hass/Heil/Weir, *Thomas' Calculus*, 14th edition (same book as the one for Math 201). **Note that Math 201 is a prerequisite for Math 202.**

Course requirements: 1) Attendance (5%); 2) two exams (25% each); 3) comprehensive final exam (45%). **Please reserve from now the dates and times of Exams 1 and 2.**

Exam 1: Saturday, March 4, 2:30pm

Exam 2: Saturday, April 1, 2:30pm.

Course description: The course will be centered around several main topics covering the notion of the solution of a differential equation, linear and non-linear differential equations, initial and boundary-value problems, series solutions, Laplace transforms, and systems. The first part of the course will be devoted to the study of vector calculus: line and surface integrals of functions and of vector fields, with special attention to Green's theorem, the divergence theorem, and Stokes' theorem.

Topics covered: Integration of vector fields along curves and on surfaces, Green's theorem, Stokes's theorem, divergence theorem, first-order differential equations, linear differential equations, series solutions, the Laplace transform, and systems of differential equations.

Course learning outcomes: At the end of the course, students will have:

- An understanding of parametrized curves and surfaces in two and three dimensions.
- The ability to compute line integrals of functions and of vector fields on curves.
- An understanding of potential functions and conservative vector fields.
- The ability to compute surface integrals on oriented surfaces.
- The ability to use the theorems of vector calculus (Green's, divergence, and Stokes' theorems) in the calculation of integrals over curves, surfaces, and regions in two and three dimensions.
- The ability to use calculus methods to integrate a differential equation.
- The ability to use infinite series methods (including the method of Frobenius) to solve a differential equation.
- The ability to use linear algebra methods (eigenvalues, eigenvectors of a matrix) to solve a system of differential equations.
- The ability to use Laplace transform methods to solve initial-value problems and systems of differential equations.

Math clinic: The department of mathematics provides a daily free math tutoring service organized by graduate students in Bliss 206B, 5–6:30pm.

Syllabus and assigned exercises: University courses are different from school: for each hour you spend in class, you need to spend **2–3 hours** on average studying at home or in the library. Carefully read and review the book and your notes **before each class**, and work through all the assigned exercises **as a minimum**.

Section Assigned homework problems

[T] Thomas/Hass/Heil/Weir, *Thomas' Calculus*, 14th edition

[T] 15.1 1–9, 11, 13, 15, 16, 17, 19, 21, 23, 25, 26, 27, 28, 33, 35, 36

[T] 15.2 1, 3, 4, 7, 9, 13, 15, 17, 19, 23, 25, 29, 33, 37

[T] 15.3 3, 5, 6, 7, 9, 12–22, 25, 28, 31, 33, 38

[T] 15.4 1–5, 7, 8, 9, 17, 19, 21, 23, 24, 26, 33, 35

[T] 15.5 1, 3, 5, 13, 14, 15, 17, 20, 23

[T] 15.6 7, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39

[T] 15.7 1, 3, 5, 6, 7, 9, 13, 15, 17

[T] 15.8 4, 9, 11, 13, 15, 19

[Z] D. Zill, *A First Course in Differential Equations with Modeling Applications*, 10th edition

[Z] 1.1 2, 3, 12, 13, 16, 17, 20, 22, 23, 25, 26, 27, 29, 37, 43, 56, 58

[Z] 1.2 1, 3, 6, 7, 9, 12, 15, 17, 19, 20, 22, 24, 29, 30

[Z] 2.2 3, 7, 8, 12, 14, 15, 17, 20, 22, 24, 26, 28, 30

[Z] 2.3 3, 7, 10, 15, 16, 19, 20, 22, 24, 26, 28, 31, 33, 37

[Z] 2.4 2, 3, 8, 9, 11, 12, 17, 18, 22, 25–34, 38, 42(a), 43

[Z] 2.5 1, 8, 9, 13, 15, 16, 17, 20, 25, 26, 29, 30, 33, 35, 36

[Z] 4.1 2, 3, 5, 7, 9, 10, 12, 13, 15, 17, 18, 19, 20, 25, 28, 31, 32, 35, 38, 39

[Z] 4.2 1, 4, 5, 8, 9, 11, 13, 17, 19, 20

[Z] 4.3 8, 13, 16, 17, 20, 22, 23, 26, 27, 30, 31, 32, 34, 36, 38, 42, 49, 50, 51, 59, 60

[Z] 4.4 1, 5, 10, 15, 19, 21, 22, 25, 30, 35, 37, 38, 39, 41

[Z] 4.6 1, 2, 3, 6, 9, 13–15, 21–24, 26, 28

[Z] 4.7 4, 7, 11, 14, 15, 17, 20, 22, 26, 28, 30, 32, 33, 34, 35, 36, 37

[Z] 6.1 5, 6, 8, 12, 14, 15, 16, 18, 19, 23, 24, 25, 27, 30, 31, 36, 37

[Z] 6.2 4, 5, 7, 10, 15, 19, 22, 23, 24, 26, 27, 28

[Z] 6.3 1, 2, 3, 6, 7, 9, 11, 12, 14, 15, 16, 18, 23, 30, 31, 32

[Z] 7.1 1, 5, 12, 13, 14, 15, 16, 17, 18, 23, 26, 27, 28, 29, 32, 33, 34, 35, 38, 40

[Z] 7.2 3, 4, 9, 13, 15, 17, 20, 24, 29, 30, 31, 32, 34, 35, 36, 39, 40

[Z] 7.3 3, 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

[Z] 7.4 4, 6, 9, 11, 13, 19, 21, 25, 26, 28, 29, 31, 32, 33, 38, 40, 45, 46

[Z] 7.5 1–12

[Z] 7.6 1, 2, 5, 7, 9, 10, 12

[Z] Appendix II: 1, 3, 8, 9, 13, 15, 19, 23, 27, 34, 38, 39, 47, 49, 51, 53, 55

[Z] 8.1 1, 2, 6, 7, 13, 25

[Z] 8.2 1, 2, 3, 4, 5, 6, 9, 13, 23, 25, 33, 34, 35, 39, 41, 42, 44, 45

[Z] 8.3 2, 4, 6, 8

Grading method:

EXAM 1 (25% of course grade), Saturday, March 4, 2:30pm, location TBA

EXAM 2 (25% of course grade), Saturday, April 1, 2:30pm, location TBA

COMPREHENSIVE FINAL EXAM (45% of course grade), time and location TBA

ATTENDANCE (5% of the course grade), taken primarily in recitation

University Policies:

- Please refer to AUB Student Code of Conduct, in particular section 1.1, which concerns academic misconduct including cheating, plagiarism, in-class disruption, and dishonesty.

Please be aware that misconduct is vigorously prosecuted and that AUB has a zero tolerance policy. Course policy is that **credible evidence of cheating will result in course failure**.

- 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 temporary medical conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office (accessibility@aub.edu.lb , AUB extension 3168, West Hall 304).

- In line with its commitment to the principle of equal opportunity in education and employment, AUB policies protect you from discrimination on the basis of protected characteristics, including discriminatory harassment and sexual harassment. Protected characteristics include: race, color, religion, age, national or ethnic identity, sex, gender or gender identity, sexual orientation, pregnancy, marital status, disability, genetic predisposition or carrier status, alienage or citizenship status, and political affiliation.

The policies are applicable to all the AUB Community. If you think you have experienced discrimination, discriminatory harassment, or sexual harassment, we encourage you to inform the Equity/Title IX Coordinator, AUB extension 2514, titleix@aub.edu.lb , report to a Title IX deputy at your faculty or at any other faculty (www.aub.edu.lb/titleix), or report online (www.aub.ethicspoint.com). Reports may be submitted anonymously or not. Please know that the University will maintain the confidentiality of the complaint and privacy of the persons involved to the greatest extent possible, consistent with its goal of conducting a thorough and complete investigation and to the extent permitted by law. For the full Title IX syllabus statement, please visit <https://www.aub.edu.lb/President/TitleIX/Pages/syllabus.aspx>