

# MATH 4100 Section 01: Differential Equations

## Course Syllabus

<b>Instructor:</b>	Samuel Walsh ( <a href="mailto:walshsa@missouri.edu">walshsa@missouri.edu</a> )
<b>Textbook:</b>	<i>Elementary Differential Equations and Boundary Value Problems</i> (Custom Edition for the Math. Dept. of MU), WILLIAM E. BOYCE AND RICHARD C. DiPRIMA 10th edition, ISBN: 978-1-118-58687-7
<b>Lecture:</b>	MWF 9:00 AM – 9:50 AM in Strickland 307
<b>Office hours:</b>	WR 4:30 – 5:30 PM in 307 Math Sci. Bldg.
<b>Website:</b>	TBA

**Overview.** This an introductory course on differential equations. We will, time allowing, cover all of the following topics.

From *Boyce & DiPrima*

- 2.1 *Linear equations (1st order) with variable coefficients*
- 2.2 *Separable equations*
- 2.3 *Modeling with first order equations*
- 2.6 *Exact equations and integrating factors*
- 3.1 *Homogeneous (2nd order) equations with constant coefficients*
- 3.2 *Solutions of linear homogeneous equations; the Wronskian*
- 3.3 *Complex roots of the characteristic equation*
- 3.4 *Repeated roots; reduction of order*
- 3.5 *Method of undetermined coefficients*
- 3.6 *Method of variation of parameters*
- 3.7 *Mechanical and electrical vibrations (mechanical vibrations only)*
- 3.8 *Forced vibrations*
- 6.1 *Definition of Laplace transform*
- 6.2 *Solutions of initial value problems*
- 6.3 *Step functions*

- 6.4 *Differential equations with discontinuous forcing functions*
- 6.5 *Impulse functions*
- 6.6 *The convolution integral*
- 2.7 *Numerical approximations: Euler's method*
- 8.1 *The Euler or tangent line method*

From *Planar systems supplement*

- 1 *Introduction*
- 2 *Some concepts from Matrix Theory and Linear Algebra*
- 3 *General theory of linear  $2 \times 2$  systems*
- 4 *Case 1*
- 5 *Case 2*
- 6 *Case 3*
- 7 *Solutions of nonhomogeneous systems*
- 8 *Qualitative methods*
- 9 *Linearization of a nonlinear system at an isolated rest point*

**Prerequisites** If you are enrolled in this course and the MU systems shows that you do not satisfy the required prerequisite (which is a C or better in MATH 2300), the Mathematics Department will drop you from the class *after* the last day for add/drop has passed, at which time, you will not be able to add another course. It is your responsibility to provide appropriate documentation for satisfying prerequisites and to check that the corresponding documentation has been entered in the MU system.

**Office hours.** There will be two office hours held every week in room 307 of the Math Science Building. This is a time when I am guaranteed to be in my office and ready to answer questions about the course. Please do not hesitate to make use of it. You can also email me to set up an appointment if you have a scheduling conflict.

**Quizzes and homework.** The majority of your learning will come through completing the homework assignments. These will be assigned weekly, but not collected. Instead, during class on Friday, there will be a *brief* quiz. The material for this quiz will be drawn directly from the homework problems assigned the previous week.

**Exams.** There will be two midterm exams and a final. The dates for the midterms are **September 27th** and **November 1st**. Please note that the final exam is scheduled for **Wednesday, December 11, 10:00 AM – 12:00 PM**. There will be no makeups without a serious excuse (e.g., medical emergency), so please plan accordingly. The final exam will be cumulative with an emphasis on later material.

**Grading.** Your final grade will be determined according to the following formula. Quizzes: 30%; Midterms 30%; Final: 40%. There will be a curve, but you will never receive a lower grade than justified by the standard MU grading scale.

**Disabilities** If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, or at my office. To request academic accommodations (for example, a note taker), students must also register with Disability Services (<http://web.missouri.edu/~accesscm>), AO38 Brady Commons, 882-4696 or 882-8054 TTY. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. Another resource, MU's Adaptive Computing Technology Center (<http://iatservices.missouri.edu/adaptive>), 884-2828, is available to provide computing assistance to students with disabilities. For more information about the rights of people with disabilities, please see [ada.missouri.edu](http://ada.missouri.edu) or call 884-7278.

**Academic Honesty** Academic honesty is fundamental to the activities and principles of a University. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. When in doubt about plagiarism or collaboration, consult the course instructor. The academic community regards academic dishonesty as an extremely serious matter, with serious consequences that range from probation to expulsion. If at any time you have questions about this policy, please ask.

**Complaints** If you have communication (or other problems) with your instructor, you can report them to Professor Konstantin Makarov (Director of Undergraduate Studies) either by phone (882-4898) or by e-mail ([makarov@math.missouri.edu](mailto:makarov@math.missouri.edu)).