Honors Ordinary and Partial Differential Equations
Math 251H, Section 001
Fall 2018

Instructor: Dr. Jessica M. Conway

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Section website: on CANVAS + http://jmconway.org/Math251H_Spring2018/Math251H_Sp2018.html

Office hours: Mondays 9:30-10:30pm, Wednesdays 1:30-3:30 + by appointment

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MATH 251H First- and second-order equations; special functions; Laplace transform solutions; higher order equations; Fourier series; second-order partial differential equations.

Prerequisites: MATH 141, or MATH 141H

Note: Students who have taken Math 250 can not schedule this course for credit.

Recommended Prerequisites: MATH 220 and one of MATH 230, MATH 230H, MATH 231, or MATH 231H

Textbook: Fundamentals of Differential Equations, by Nagle, Saff, and Snider, 8th Edition.

Additional materials: Direction fields and phase plane software available at http://math.rice.edu/simdfield/dfpp.html. MATLAB may also be used for a few demonstrations. It is available for free as a WebApp at https://webapps.psu.edu/. Finally we will use web-based software (no downloads needed) for demonstrations when we get to sections 4.9/4.10.

Course format: There are four 50-minute lectures each week.

Electronic aides: NO calculators, cell phones, tablets, smart watches, <insert device here>, are allowed on quizzes, midterms, or on the final examination.

Examinations: There will be two 75-minute evening midterm examinations, and a comprehensive final exam.

> *Midterm #1,* Thursday Feb. 22, 6-7:15 pm (location TBA).
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> *Midterm #2,* Monday Apr 2, 6-7:15 pm (location TBA).
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> *Final Exam,* week of April 30, date, time, and location TBA.

Conflict and Make-up midterm examinations: Same general guidelines as for other classes. From the Math 251 Syllabus:

For each midterm exam, there is a *conflict exam* session, probably from 4:35-5:50 pm on the same day as the regularly scheduled exam. Students with schedule conflicts may sign up to take the conflict exam, in person, with Dr. Conway personally, at least one week prior to the scheduled exam. A student will not be allowed to take the conflict exam without having so signed up with his/her instructor first. A student who forgets to sign up to take conflict exam in time, and whose schedule conflicts with the regular exam, may instead sign up for the makeup exam, but is subject to a 5% penalty, up to the day before the regularly scheduled exam. (A student who fails to so sign up before the day of the regularly scheduled exam, and who is otherwise not eligible to take the makeup exam without penalty, would still be subject to the 20% penalty as described in the next paragraph.)

In addition, a *makeup exam* will be given about a week after the regularly scheduled exam. Students who have a valid documented reason, such as a class conflict or illness, during both the conflict and regular examination times are permitted to schedule a makeup examination with no penalty. To sign up to take a makeup exam, Dr. Conway, in person. Students must be prepared to verify the reason for taking the makeup by providing the proper document(s) upon request. **Personal business such as travel, employment, weddings, graduations, or attendance at public events such as concerts, sporting events, and Greek Rush events are not valid excuses. Nor is forgetting the date, time or room of an examination a valid excuse.** Students who do not have an approved reason for missing the examination are permitted to schedule to take the makeup, but 20% will be deducted from their score. Students who have taken either the regularly scheduled examination or conflict examination are not permitted to take the makeup examination. The makeup examinations are given from 6-7:15 pm (exact dates/locations TBA).

Final examination: The final examination will be given during the week of April 30, 2018. Students may access their final exam schedules after February 12, 2018, through their LionPath accounts. Notification of conflicts is given on the student's final exam schedule. A student must take action to request a conflict exam through LionPath

between February 12 and March 4, 2018. Conflict final examinations **cannot** be scheduled through Dr. Conway or the mathematics department.

Late drop: Students may add/drop a course without academic penalty within the first ten calendar days of the semester. A student may late drop a course within the first twelve weeks of the semester but will accrue late drop credits equal to the number of credits in the dropped course. A baccalaureate student is limited to 16 late drop credits. The late drop deadline for the Spring semester 2018 is April 6, 2018.

Evaluation: Your final grade will be calculated over a total of 500 points, distributed as follows:

Midterm #1	100 (20%)
Midterm #2	100 (20%)
Final exam	150 (30%)
Homework	50 (10%)
Quizzes	70 (14%)
Mini project	30 (6%)
TOTAL	500 (100%)

Note that there is **NO extra credit**.

Grades will be based on the percentage scale as follows: 95%-100% is an A, 90%-95% is an A-, 88%-100% is a B+, 83%-88% is a B, 80%-83% is a B-, 75%-80% is a C+, 70%-75% is a C, 60%-70% is a D, and 0%-60% is an F.

Deferred grades: Students who are currently passing a course but are unable to complete the course due to illness or emergency may be granted a deferred grade which will allow the student to complete the course within ten weeks of the last day of classes. Note that deferred grades are limited to those students who can verify and document a valid reason for not being able to take the final examination. For more information see http://handbook.psu.edu/content/deferred-grade.

Homework: There will be weekly homework, due in class on Mondays, unless explicitly stated. Homework will only be checked for completion, but not graded. For each completed homework set you will gain 5 points in that category, for a maximum of 50 points. Partially completed home work sets will not receive any credits. **Late home work will NOT be accepted.** In compensation, you may only turn in totally 10 home works (there will be 11-13 homework assignments).

Note: Completing all the homework is strongly recommended to improve success in the class.

Quizzes: There will be weekly in-class quizzes, on Wednesdays, unless otherwise announced. These quizzes will be 1-5 problems, related to the previous week's homework, and last 15 minutes. **There are no make-up quizzes**, but your lowest two quiz scores will be dropped from the final grade calculation.

Projects: There will be 3 short mini-projects due throughout the semester, tentatively on Feb 16, Mar 23, and Apr 27 relating to course materials. Topics will be drawn from textbook projects and will be posted on the course website. Project guidelines are posted on the course website.

Academic Integrity: Collaboration on exams and independent study problem sets is **not permitted**. Unless explicitly stated, collaboration on quizzes is **not permitted**.

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Penn State Learning: The Penn State Learning is a student service providing free "drop-in" peer tutoring, as well as peer-lead exam review sessions. For 200-level Math courses, this tutoring service is offered semester-long Sundays through Thursdays from 6pm to 9:30pm, starting September 4th, in room 007 Sparks.

Students with Disabilities: Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Office for Disability Services (ODS) Web

site provides contact information for every Penn State campus: http://equity.psu.edu/sdr/disability-coordinator. For further information, please visit the Office for Disability Services Web site: http://equity.psu.edu/sdr/.

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: http://equity.psu.edu/sdr/guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Counseling and Psychological Services: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- Counseling and Psychological Services at University Park (CAPS)
  (http://studentaffairs.psu.edu/counseling/): 814-863-0395

- Counseling and Psychological Services at Commonwealth Campuses
  (http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/)

- Penn State Crisis Line (24 hours/7 days/week): 877-229-6400
  Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity and Reporting: Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias webpage (http://equity.psu.edu/reportbias/).

Important dates: Please see http://registrar.psu.edu/academic_calendar/fall17.cfmfor important dates including holidays and administrative deadlines.

Questions, Concerns, or Comments: If you have questions or concerns about the course, please consult Dr. Conway first. If further guidance is needed, you may contact Dr J. Sellers (jxs27@psu.edu), the Director for Undergraduate Study.

Tentative schedule (subject to change)

Week	Topics	Sections covered	Notes
Jan 8	Introduction, direction fields, 1st order linear equations, separable equations, integrating factors.	1.1-1.3, 2.1-2.3	Jan 13: Regular drop ends Jan 14: Regular add ends
Jan 15	Exact equations, special integrating factors, substitutions and transformations	2.4-2.6	
Jan 22	Modeling with first-order equations	3.1-3.5	
Jan 29	Second order linear equations: homogeneous equations, general solution, auxiliary equation. Nonhomogeneous equations: method of undetermined coefficients	4.1-4.4	
Feb 5	Nonhomogeneous equations: method of undetermined coefficients, variation of parameters Variable-coefficient equations.	4.5-4.8	
Feb 12	Free & forced vibrations: mechanical and electrical vibrations. Higher order equations.	4.9-4.10, 6.1-6.2	
Feb 19	Systems of differential equations: phase plane analysis and applications MIDTERM 1 THURSDAY	5.1-5.2, 5.4	
Feb 26	Systems of differential equations: phase plane analysis and applications, solving linear systems	5.4 (touch on 5.5-7) 9.1-9.3	
Mar 5	SPRING BREAK - NO CLASSES		
Mar 12	Systems of differential equations: solving linear systems	9.4-9.7	
Mar 19	Laplace transforms: definitions, properties, inverse, initial value problems	7.1-7.5	
Mar 26	Laplace transforms: discontinuous and periodic functions, convolution, impulses	7.6-7.8	
Apr 2	Partial differential equations: Separation of variables, Fourier series MIDTERM 2 MONDAY	10.1-10.3	Apr 6: Late drop deadline
Apr 9	Partial differential equations: Fourier sine & cosine series, heat equation	10.4-10.5	
Apr 16	Wave equation, Laplace equation.	10.6-10.7	
Apr 23	More wave equations, d'Alembert solution of the wave equation in an infinite string.	10.8	Apr 27: Withdrawal deadline