Math 306: Matrix and Power Series Methods

Winter 2019

(Section 20, CRN 31557)

Course Credits: 4
Lectures: 12:00 - 12:50 PM on Monday, Wednesday, Friday at Kidder Hall 364.
Instructor: Tuan Pham, [phamt3@oregonstate.edu]
TA: Charles Camacho, [camachoc@math.oregonstate.edu]
Couse website: http://people.oregonstate.edu/~phamt3/Courses/W19-Math-306/W19-Math-306.html. Most materials will also be posted on Canvas.
Office: Kidder 268, **phone:** 541-713-6196
Office Hours: MWF 1:00 - 3:30 PM, Kidder 268.

Textbook: "*Matrix and Power Series Methods*", 5th Edition, by John W. Lee and Stephen D. Scarborough. We will follow a slightly different order of topics compared to the textbook (see the tentative calendar).

Course Description: As indicated in the name, the course content consists of two parts:

1. Matrix methods for linear maps:
   - Matrix algebra
   - Determinants
   - Systematic solution to linear systems
   - Eigenvalue problems.
2. Series methods for nonlinear maps:
   - Convergence and divergence of series with emphasis on power series
   - Taylor series expansions
   - Convergence tests for power series
   - Error estimates for truncated series used in practical approximations.

Learning Outcomes: A successful student in MTH 306 will be able to:

1. Solve a system of linear equations by Gauss elimination method.
2. Find the matrix form of a given linear map.
3. Perform basic matrix operations: addition, subtraction, multiplication. For square matrices, find inverse, determinants, eigenvalues, and eigenvectors.
4. Find Taylor series of a nonlinear function.
5. Approximate a given function by Taylor polynomials. Estimate the error.
6. Use the basic tests (comparison, integral, ratio, and root test) to determine whether a given series converge or diverge.
7. Determine the radius and interval of convergence for a power series.

Grading weights:
Recitation quizzes: 20%
Group project: 15% (another 3% can be earned as bonus)
Midterm: 30%
Final Exam: 35%

Suggested Homework: There will be 8 suggested homework sets. These are not for submission, but are the ground your recitation quizzes, midterm and final exams are based upon.
Purpose: Attempting to solve these problems is an important part of understanding what you are learning.
Policy: No submission, but you are strongly recommended to work through.

Quizzes: There will be 6 quizzes, given during recitation classes. Each quiz is based on the suggested homework set of the previous week. Check the class calendar for the dates.
Purpose: Check your understanding of the topics covered in the previous week (but not on the day before the quiz).
Policy: Each quiz is worth 15 points. Make-up quizzes are available only in case of medical emergency or university-related obligation. Calculators are not allowed. Any regrading requests must be made within one week after the work being returned to you.

Group project: On the day of the midterm exam, you will be given a few group projects. Each group work together on one project of their choice. Each member writes their own report.
Purpose: Check your ability to apply what you have learned in the course to solve a practical problem. Collaborating with your partner(s) is also an important skill.
Policy: The project is worth 25 points plus 5 extra points, which add up to the maximum of 30. Each group should have 2-3 members. Each group have 3 weeks to work on their project. Project reports are due at the beginning of the recitation class on March 5.

Exams: There will be one midterm and a comprehensive final exam (with emphasis on the second half of the course). The midterm exam will be held on **Tuesday Feb 12, 7:00–8:20 PM at Wiegand Hall 115.** The final exam will be on **Monday Mar 18, 7:30–9:20 AM at Gilbert Hall 224.**
Policy: The midterm and final exams are mostly based on the suggested homework problems, recitation quizzes, and recitation worksheets. Note cards are not allowed in neither exams. Calculators are not allowed in midterm exam, but are allowed for final exam (you are recommended to bring one, either scientific or graphing). Cellphones, laptops and other electronic devices are not allowed. Any regrading requests for midterm exam must be made within 15 days after the work being returned to you. Exams cannot be rescheduled or taken early unless in truly exceptional circumstances. Requests for such accommodations must be made prior to the exam. If you have time conflicts, please contact your TA as soon as possible.

Grade lines: the course grades will not be harder than: A, A- 100-90%, B+, B, B- 89-80%, C+, C, C- 79-70%, D+, D, D- 69-60%, and F 59% or under. You can view your scores on Canvas. The running total that Canvas provides does not take into account the weights mentioned above. Your final course score will be computed by the instructor at the end of the term.

Other Learning Resources: The Math Learning Center MLC in Kidder 108 is a great place to drop in for help. It is open from 9 AM to 4 PM Monday through Friday from the second week of classes through the end of dead week.

Academic Honesty: OSU's Statement of Expectations for Student Conduct:
http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf

Statement Regarding Students with Disabilities: Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations.