COURSE CALENDAR

MATHEMATICAL METHODS FOR THE PHYSICAL SCIENCES

SPRING SEMESTER 2024

https://www.phys.uconn.edu/~rozman/Courses/P2400_24S/

Last modified: April 24, 2024

The chapter, section, and the page numbers below refer to the following editions of the course textbook: **HC** – Hung Cheng, *Advanced Analytic Methods in Applied Mathematics, Science, and Engineering*, Luban Press, 2006;

TUESDAY	THURSDAY
Jan 16th **Classes cancelled due to snow storm**	Jan 18th **Lecture 1** Computer algebra systems: a very short introduction to *Mathematica* (handout) Differentiating under the integral sign (handout) Homework 1 assigned: due on 1/25/2024
Jan 23rd **Lecture 2** Differentiating under the integral sign, II (handout)	Jan 25th **Lecture 3** Gamma function, $\Gamma(x)$, Beta function, $B(x,y)$ (handout) Homework 2 assigned: due on 2/1/2024
Jan 30th **Lecture 4** Gamma function, $\Gamma(x)$, Beta function, $B(x,y)$, II (handout) Complex numbers, **HC**, Ch. 2, pp. 35–38	Feb 1st **Lecture 5** Euler's formula (handout) Coordinate and polar form; powers of complex numbers Homework 3 assigned: due on 2/8/2024
Feb 6th **Lecture 6** Algebra of complex numbers Complex functions Derivative of a complex function. Cauchy-Riemann conditions. **HC**, Ch. 2, pp. 35–47.	Feb 8th **Lecture 7** Cauchy-Riemann conditions, II Analytic functions. Integral of a complex function Cauchy's integral theorem (handout). Applications of Cauchy's theorem (handout) Homework 4 assigned: due on 2/15/2024
Feb 13th **Classes cancelled due to snow storm**	Feb 15th **Lecture 8** **Midterm I assigned; Due on 2/22/2024** Applications of Cauchy's theorem, II (handout) Cauchy's integral formula. **HC**, Ch. 2, pp. 51–53. Liouville theorem. (handout)

Tuesday	Thursday
Feb 20th **Lecture 9** Taylor and Laurent series. **HC**, Ch. 2, pp. 53–57. Poles, residues, Cauchy residue theorem. **HC**, Ch. 2, pp. 58–59.	Feb 22nd **Lecture 10** Calculating residues. **HC**, Ch. 2, pp. 58–59. Evaluating real integrals. **HC**, Ch. 2, pp. 59–70. Homework 5 assigned: due on 2/29/2024
Feb 27th **Lecture 11** Method of residues, II. (handout) **HC**, Ch. 2, pp. 59–70.	Feb 29th **Lecture 12** Method of residues, III. Calculating residues for higher order poles. Homework 6 assigned: due on 3/7/2024
Mar 5th **Lecture 13** Constructing "terrible" integrals (handout) Laplace method for differential equations (handout)	Mar 7th **Lecture 14** Laplace method for differential equations, II (handout) Homework 7 assigned: due 3/21/2024
Mar 12th **Spring Recess – No classes**	Mar 14th **Spring Recess – No classes**
Mar 19th **Lecture 15** The method of dominant balance Harmonic oscillator in quantum mechanics, II (handout).	Mar 21st **Lecture 16** **Midterm II** **Due on March 28, 2024.** Laplace method for differential equations, III (handout)
Mar 26th **Lecture 17** Laplace method for integrals, I (handout).	Mar 28th **Lecture 18** Laplace method for integrals, II (handout). Moving extrema. Asymptotics for Gamma function. Homework 8 assigned: due on 4/4/2024
Apr 2nd **Lecture 19** The method of stationary phase, I (handout).	Apr 4th **Lecture 20** The method of stationary phase, II (handout). Homework 9 assigned: due on 4/11/2024
Apr 9th **Lecture 21** The method of stationary phase, III. Integration by parts. (handout).	Apr 11th **Lecture 22** The method of stationary phase, IV. (handout). Homework 10 assigned: due on 4/25/2024
Apr 16th **Lecture 23** Perturbation methods. (handout).	Apr 18th **Lecture 24** Perturbation methods, II. (handout).
Apr 23rd **Lecture 25** **Midterm III** **Due on May 2, 2024, 6 pm – 8 pm, in GS-119** Perturbation methods, III. (handout).	Apr 25th **Lecture 26** Perturbation methods, IV. (handout). Course review

Tuesday	Thursday
Apr 30th **Week of Finals**	May 2nd **Week of Finals**