ACADEMIC CALENDAR

MATHEMATICAL METHODS FOR THE PHYSICAL SCIENCES

SPRING SEMESTER 2017

http://www.phys.uconn.edu/~rozman/Courses/P2400_17S/

Last modified: April 22, 2017

TUESDAY	THURSDAY
Jan 17th **Lecture 1** (a) course logistics (b) R. Feynman, The relation of Mathematics and Physics (c) Computer algebra systems: a very short introduction to *Mathematica* (handout) Homework 1 assigned: due Jan 24	Jan 19th **Lecture 2** Textbook Ch. 6 *Evaluation of integrals* (handout) (a) Gaussian integrals, (b) Gamma function, $\Gamma(x)$; recurrence relation for $\Gamma(x)$; Gamma function and factorial, (c) Euler's formula (handout)
Jan 24th **Lecture 3** (a) Adding convergence factors to integrals, (b) Gamma function and n-dimensional sphere (handout), (c) Beta function, $B(x,y)$, (handout), (d) 1d potential motion (handout), (e) Duplication formula for Gamma function (handout)	Jan 26th **Lecture 4** (a) Beta function, $B(x,y)$ (handout), (b) Differentiation with respect to a parameter, (c) Euler summation; binding energy of a 1d ionic solid (handout), (d) Frullani's integral (handout), (e) Leibniz's formula. Homework 2 assigned: due Jan 31
Jan 31st **Classes cancelled due to snow storm**	Feb 2nd **Lecture 5** (a) Leibniz's formula, (b) Complex numbers; coordinate and polar form; powers of complex numbers; logarithms of complex numbers (handout). Homework 3 assigned: due Feb 7
Feb 7th **Lecture 6** (a) Complex functions, real and imaginary parts of complex functions, $f(z) = u(x,y) + iv(x,y)$. (b) Derivative of a complex function. Cauchy-Riemann conditions. (handout) (c) Analytic functions. Integral of a complex function. Cauchy's integral theorem (handout). Homework 4 assigned: due Feb 16	Feb 9th **Classes cancelled due to snow storm**

Tuesday	Thursday
Feb 14th **Lecture 7** Cauchy's integral theorem (handout). Deformation of integration contours.	Feb 16th **Lecture 8** (a) Cauchy's integral formula. (b) The integral that stumped Feynman. (c) Taylor and Laurent series. (d) Poles and residues. Homework 5 assigned: due Feb 28
Feb 21st **Lecture 9** Method of residues, handout, Ch. 8.1.	Feb 23rd **Lecture 10** Method of residues, II. Jordan's lemma (handout).
Feb 28th **Lecture 11** Method of residues, III. Advanced choices of integration contours.	Mar 2nd **Midterm I**
Mar 7th **Lecture 12** Laplace method for differential equations (handout).	Mar 9th **Lecture 13** Laplace method for integrals (handout).
Mar 14th **No classes – Spring Break**	Mar 16th **No classes – Spring Break**
Mar 21st **Lecture 14** Laplace method for integrals, II (handout).	Mar 23rd **Lecture 15** Laplace method for integrals, III. The method of stationary phase. (handout). Homework 6 assigned: due March 30
Mar 28th **Lecture 16** The method of stationary phase, II. (handout).	Mar 30th **Lecture 17** The method of stationary phase, higher order corrections. Integration by parts. (handout). Homework 7 assigned: due April 6
Apr 4th **Lecture 18** Weakly nonlinear oscillators. The method of averaging. (handout).	Apr 6th **Lecture 19** Weakly nonlinear oscillators. The method of averaging, II (handout). Homework 8 assigned: due April 13
Apr 11th **Lecture 20** Partial differential equations. Separation of variables. (handout).	Apr 13th **Lecture 21** Dimensional analysis
Apr 18th **Lecture 22** Regular perturbation theory (handout).	Apr 20th **Lecture 23** Singular perturbation theory (handout).
Apr 25th **Lecture 24** Singular perturbation theory, II. Boundary layers. Van der Pol oscillator with large nonlinearity. (handout).	Apr 27th **Lecture 25**

Tuesday	Thursday
May 2nd **Week of Finals**	May 4th **Week of Finals**