

# Physics 403 Syllabus

Fall 2009

Lectures: Tuesdays and Thursdays, 3–4:20 pm, Jadwin A06

Problem Session: Tuesdays, 8 pm, Jadwin A06

## Contact Information

Lecturer: Professor Christopher Herzog

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Jadwin 331, 258-4743

Office hours: Wednesdays 2–4 pm, drop by or email for other times

AI: Mikhail Tikhonov

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Jadwin 262

Office hours: Wednesdays 8–9 pm

## Schedule

Week	Tuesday		Thursday	
1	Feb 1	Linear Algebra, H1-4	Feb 3	Linear Algebra, H5
2	Feb 8	Linear Algebra, H6	Feb 10	Linear Algebra, H7
3	Feb 15	Linear Algebra, H8, SG2	Feb 17	Diffeqs, H12
4	Feb 22	Diffeqs, H13	Feb 25	Diffeqs, H14
5	Mar 1	Diffeqs, SG3	Mar 3	Linear Operators, H16
6	Mar 8	Linear Operators, H16	Mar 10	Linear Operators, H18
8	<b>Spring recess</b>			
7	Mar 22	Linear Operators, H19, SG4	Mar 24	Green's Functions, H20
9	Mar 29	Green's Functions, H21	Mar 31	Green's Functions, H22, SG5
10	Apr 5	Finite Groups, H23	Apr 7	Finite Groups, H24
11	Apr 12	Finite Groups	Apr 14	Lie Groups, H27
12	Apr 19	Lie Groups, H28	Apr 21	Lie Groups
13	Apr 26	Lie Groups	Apr 28	Lie Groups
14	<b>Reading period</b>			

There may be one additional lecture on May 3, during reading period.

## Textbooks

H  $\equiv$  Hassani, *Mathematical Physics* (required)

SG  $\equiv$  Stone and Goldbart, *Mathematics for Physics I and II*  
(webusers.physics.illinois.edu/~m-stone5/)

C  $\equiv$  Cahn, *Semi-Simple Lie Algebras and their Representations*  
(phyweb.lbl.gov/~rncahn/www/liealgebras/book.html)

Hassani is on reserve in Fine Library. The other texts above are available online via their authors' webpages.

Some other useful mathematical physics textbooks are *Methods of Theoretical Physics* by Morse and Feshbach, *Lie Algebras in Particle Physics* by Georgi, *Mathematics for Physics and Physicists* by Appel, and *Mathematical Methods for Physicists* by Arfken and Weber.

## Course Outline (Tentative)

1. Linear Algebra (5 lectures)
  - Review of finite dimensional vector spaces
  - Hilbert spaces
  - Distributions
  - Orthogonal polynomials and Fourier series
2. Differential Equations (4 lectures)
  - Separation of variables
  - Second order linear diffeqs
  - Complex analysis of SOLDEs
3. Linear Operators (4 lectures)
  - Bounded and compact operators
  - Spectral theorem for compact operators
  - Sturm-Liouville problems
4. Green's Functions (3 lectures)
5. Group Theory (8 lectures)
  - Finite groups
  - Lie groups

## Homework

There will be at least ten weekly homework assignments due in class on Thursday. At the discretion of the lecturer and the AI's, late homework assignments may be accepted for partial credit. Homeworks will (hopefully) be posted on Blackboard at least ten days prior to their due date.

## Grade Weighting

Homeworks	40%
Midterm	20%
Final	40%