

STAT 598D: Computational Statistics

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World-wide web: <http://www.stat.purdue.edu/~chuanhai/Stat598D/index.html>
Lectures: TR 3:00 PM - 4:15 PM, Recitation Building 112
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Phone number:
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TEXTBOOKS: 1. *Computational Statistics*, 2nd Edition
by G. H. Givens and J. A. Hoeting (GH)
2. *Advanced Markov Chain Monte Carlo Methods*
by F. Liang, C. Liu, and R. Carroll (LLC)
PREREQUISITES: Stat 598G

- *Course Description (OLD)*: The course focuses on two fundamental aspects in computational statistics: (1) what to compute and (2) how to compute. The first is covered with a brief review of advanced topics in statistical inference. The second is discussed in detail by examining exact, approximation, and iterative simulation methods for statistical inference with a variety of commonly used statistical models. The emphasis is on the EM-type and quasi-Newton algorithms, numerical differentiation and integration, and Markov chain Monte Carlo methods.
- *Course Goals*: Better understanding of (1) statistical inference, (2) numerical techniques, (3) statistical thinking in solving optimization problems, and (4) iterative simulation methods.
- *Learning Objectives*: (1) Understand probabilistic inference, (2) Be familiar with limitations of existing schools of thought on uncertain inference, (3) Code quasi-Newton algorithms, (4) Code simple numerical differentiation and integration methods, (5) Derive and implement EM-type algorithms for commonly used statistical models, (6) Derive and implement the Gibbs sampler, and (7) Design and implement MCMC algorithms, especially the Metropolis-Hastings algorithm.

- *Course Outline:* <http://www.stat.purdue.edu/~chuanhai/Stat598D/index.html>
- *Policies:*

1. *Grading:* The course average will be determined solely from the following

Homework:	40%
Midterm Exam:	30%
Final Exam (or Term Project):	30%

The (final) numerical ranges for each letter grade:

Range	Grade	Range	Grade	Range	Grade
98-100	A^+	65-69	C^+	0-39	F
93-97	A	60-64	C		
90-92	A^-	55-59	C^-		
85-89	B^+	50-54	D^+		
75-84	B	45-49	D		
70-74	B^-	40-44	D^-		

2. *Homework assignments:* Homework will be assigned most weeks. Homework assignment problems are not necessarily on the topics fully covered in class. You may discuss the homework problems with other students, but you should write up your solution independently.
3. *Academic Dishonesty (the University policy):* Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, see University Regulations at <http://www.purdue.edu/univregs/>] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]
4. *Attendance:* The University policy for attendance is that *Students are expected to be present for every meeting of the classes in which they are enrolled.* Class attendance will be taken at random and used to adjust the final grades.
5. *Missed or Late Work:* (1) Late homework will not be accepted; (2) For students who miss midterm exams, their scores will be imputed based on their final exams. This doesn't apply to students who work on term projects as alternatives to their final exams; and (3) Missed final exams will not be allowed.

6. *Students with Disabilities:* Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University.

If you have a disability that requires special academic accommodation, please make an appointment to speak with me within the first three (3) weeks of the semester in order to discuss any adjustments. It is important that we talk about this at the beginning of the semester. It is the student's responsibility to notify the Disability Resource Center (<http://www.purdue.edu/drc>) of an impairment/condition that may require accommodations and/or classroom modifications.

7. *Emergencies:* In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructors control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.
8. *Nondiscrimination:* Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies.