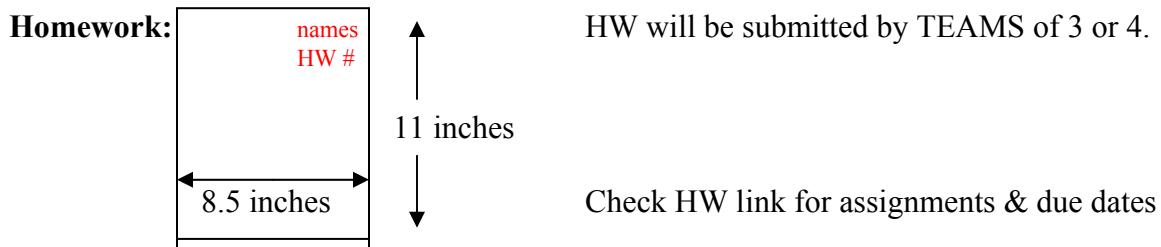


22S:195

Instructor: Prof. RUSSO 205 SH 335-0817 rrusso@stat.uiowa.edu
Website: [department → faculty → R.Russo → courses → S195](#) ↑
Office Hours: **M&F 4-5PM, Th 9:30-10:30AM** *the best way to reach me*

Text: [Introduction to Probability Models](#) 9th ed., Sheldon M. Ross
Topics: Chapters 1 - 2 (mostly review), 3, 4, 5, 7, 10 & selected topics

Class meetings: Class attendance is essential. Please do not arrive late or leave early. The course contains too much material to cover in class. I will try to cover the main ideas, point out subtleties, & provide a framework. **PLEASE READ AHEAD.**



Exams & quizzes: There will be a 90 minute midterm exam given at the half way point, 8-10 twenty minute quizzes (the lowest of which will be dropped) & a two-hour Cumulative Final Exam given during Finals Week.

Grades:	Homework	20%	check the web
	Quizzes	20%	8-10 (on Wednesdays)
	Midterm	20 or 30%	at the half-way point
	<u>FINAL EXAM</u>	30 or 40%	18 Dec. 9:45 AM
	TOTAL	100%	

As a rough guide "A" = 90%, "B" = 80%, "C" = 70%, "D" = 60%.

Make-ups: If something unexpected arises (illness, emergency,...) or expected (job interview, ...), let me know as soon as possible & we will discuss your situation.

INFORMATION FOR STUDENTS WITH DISABILITIES I would like to hear from anyone who has a disability which may require seating or testing accommodations, or accommodations for other class requirements, so that appropriate arrangements may be made. Please contact me during my office hours.

POLICIES Course policies are governed by the College of Liberal Arts and Sciences.

Dept. of Statistics & Actuarial Science, 241 SH, <http://www.stat.uiowa.edu>
Prof. Tierney, DEO 335-0712, luke-tierney@uiowa.edu

The College of Liberal Arts and Sciences Policy and Procedures

Academic Fraud. Plagiarism and any other activities that result in a student presenting work that is not his or her own are academic fraud. Academic fraud is reported to the departmental DEO and then to the Associate Dean for Academic Programs and Services in the College of Liberal Arts and Sciences. www.clas.uiowa.edu/students/academic_handbook/ix.shtml

Making a Suggestion or a Complaint. Students have the right to make suggestions or complaints and should first visit with the instructor, then with the course supervisor if appropriate, and next with the departmental DEO. All complaints must be made within six months of the incident. www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5

Accommodations for Disabilities. A student seeking academic accommodations first must register with Student Disability Services and then meet with a SDS counselor who determines eligibility for services. A student approved for accommodations should meet privately with the course instructor to arrange particular accommodations. www.uiowa.edu/~sds/

Understanding Sexual Harassment. Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. Visit www.sexualharassment.uiowa.edu/ for definitions, assistance, and the full policy.

Administrative Home of the Course. The administrative home of this course is the College of Liberal Arts and Sciences, which governs academic matters relating to the course such as the add / drop deadlines, the second-grade-only option, issues concerning academic fraud or academic probation, and how credits are applied for various CLAS requirements. Please keep in mind that different colleges might have different policies. If you have questions about these or other CLAS policies, visit your academic advisor or 120 Schaeffer Hall and speak with the staff. The CLAS Academic Handbook is another useful source of information on CLAS academic policy: www.clas.uiowa.edu/students/academic_handbook/index.shtml

University Examination Policy

Final Examinations. An undergraduate student who has two final examinations scheduled for the same period or more than three examinations scheduled for the same day may file a request for a change of schedule before the **published deadline** at the Registrar's Service Center, **17 Calvin Hall**, 8-4:30 M-F, (384- 4300).

Missed exam policy. University policy requires that students be permitted to make up examinations missed because of illness, mandatory religious obligations, certain University activities, or unavoidable circumstances. Excused absence forms are required and are available at the Registrar web site: www.registrar.uiowa.edu/forms/absence.pdf

Reacting Safely to Severe Weather. The University of Iowa Operations Manual section 16.14 outlines appropriate responses to a tornado (i) or to a similar crisis. If a tornado or other severe weather is indicated by the UI outdoor warning system, members of the class should seek shelter in rooms and corridors in the innermost part of a building at the lowest level, staying clear of windows, corridors with windows, or large free-standing expanses such as auditoriums and cafeterias. The class will resume, if possible, after the UI outdoor warning system announces that the severe weather threat has ended.

S195 NOTES

topics from chapters 1 & 2

independent events

Bayes' formula

$\lim P(E_n) = P(\lim E_n)$ if $E_n \uparrow$ or $E_n \downarrow$

CDF & properties

$E(X_1 + \dots + X_n) = E(X_1) + \dots + E(X_n)$

$E(X) = \int P(X > t)dt$ for non neg rv's

Bernoulli, binomial, Poisson, hypergeometric, geometric, neg bin
exponential (& memoryless prop), uniform, normal, gamma

mgf's

geometry associated with joint pdf's

independent random variables

Covariance & variance of a sum

limit theorems

(skip 2.5.4, 2.6.1)

topics from chapter 3

conditional pmf's & pdf's

conditional means & variances

computing probabilities by conditioning

computing expectations & variances by conditioning

(the double expectation formula)

examples: $P(\text{event A before event B})$, $P(1^{\text{st}} \text{ player wins})$,

particle movement, 2, 3, 4, 10, 11, 12, 14

the conditional variance formula & example 3.18

topics from chapter 4

transition probability matrix

Markov property

transforming a process into a Markov chain

absorbing states,

classification of states (communication, equiv. rel., irreducibility)

recurrent vs. transient states

$f_i = P(\text{ever returning to state } i \mid \text{start in state } i)$

$E(\text{numb of returns to } i \mid \text{start in state } i) = 1/(1 - f_i)$

criterion for recurrence: $\sum P_{k,k}^{(n)} = \infty$ (transient if finite)

random walks

doubly stochastic TPM's

meaning $\alpha^T P^{(n)}$

stationary probabilities of a Markov chain.

limiting proportion of time spent in the various states

gambler's ruin

degree is a class property:

1 2 round trip in m steps (say) for some path

$R = \{m, r_1, r_2, \dots\}$ = all path lengths from 1 back to 1

$S = \{m, s_1, s_2, \dots\}$ = all path lengths from 2 back to 2

If α is a common divisor of the members of R , then α must divide $m + s_k$ for all k (why?). Thus, α must divide s_k for all k (why?), so that α is a common divisor of the members of S . Therefore, all common divisors of R must also be common divisors of S . Similarly, all common divisors of S must also be common divisors of R . Hence, states 1 & 2 have the same period.

topics from chapter 5

properties of exponential

memoryless property

constant hazard rate function

sum of n independent $\exp(\lambda)$'s $\sim \text{gamma}(n, \lambda)$

$\min[\exp(\lambda), \exp(\mu)] \sim \exp(\lambda + \mu)$

$P[\exp(\lambda) < \exp(\mu)] = \lambda / (\lambda + \mu)$