Instructor:  Prof. RUSSO  205 SH  335-0817  rp-russo@uiowa.edu

Office Hours:  TBA

Topics:  Chapters 1 - 2 (mostly review), 3, 4, 5, 7&10(portions), &
"martingale theory" if time permits.

Class meetings:  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 in the book.

Homework:  HW will be submitted by TEAMS of 3 or 4.

HW & due dates to be posted on ICON content.

Exams & quizzes:  There will be a 2-hour midterm exam given at the half way point on a
Thursday evening (date to be announced),  8-10 twenty-minute quizzes (the lowest of which will
be dropped) & a two-hour Cumulative Final Exam during Finals Week.

Grades:

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<tr>
<td>HOMEWORK</td>
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<td>QUIZZES</td>
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<td>MIDTERM EXAM</td>
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<td>CUMULATIVE FINAL EXAM</td>
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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.

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

Prof. Tierney, DEO  335-0712,  luke-tierney@uiowa.edu
topics from chapters 1 & 2

independent events
Bayes’ formula
\[ P(E_n) = P(\lim E_n) \text{ if } E_n \uparrow \text{ or } E_n \downarrow \]
CDF & properties
\[ E(X_1 + \ldots + X_n) = E(X_1) + \ldots + E(X_n) \]
\[ E(X) = \int_{0}^\infty P(X > t) dt \text{ for non neg rv’s} \]
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

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
\[ f_i = P(\text{ever returning to state i } | \text{ start in state i }) \]
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 \quad (\text{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 \xrightarrow{-}- 2 \quad \text{round trip in } m \text{ steps (say) for some path}

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

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

If  \alpha  is a common divisor of the members of R, then  \alpha  must divide  m + s_k  for all  k  (why?). Thus,  \alpha  must divide  s_k  for all  k  (why?), so that  \alpha  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 the exponential random variable
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)

Poisson process
definition, waiting times, process properties
compound Poisson process, nonhomogeneous Poisson process
Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at http://clas.uiowa.edu/students/handbook.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2, k.11).

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the tenth day of classes. Final exams are offered only during the official final examination period. **No exams of any kind are allowed during the last week of classes.** All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.
Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.