

## Syllabus for Stat 6201: Mathematical Statistics Autumn 2019

**Instructor:** Dr. H. N. Nagaraja (Raj)

**Office:** 400C Cunz Hall

**Office Hours:** MWF 9:30-10:30am, other times by appointment

**Office Phone:** TBD

**E-mail:** nagaraja.1@osu.edu (the best way to reach me!)

**Homework Grader:** Jacob Howell; howell.554@osu.edu

**Course meeting times and location:** MWF 8:00-9:15am, 218 Cockins Hall

**Required Text:** Probability and Statistics, Fourth Edition, by Morris H. DeGroot and Mark J. Schervish, Pearson Education, 2012

**Prerequisites:** MATH 2153 (multivariable differential and integral calculus) or permission of instructor. This course is not open to students with credit for STAT 6301 or STAT 6801.

**Website:** Please visit <https://carmen.osu.edu/>. Check periodically for announcements about the class and other class material.

**Course Description:** Statistics 6201 offers an introduction to some of the core concepts from probability theory and statistical inference. Topics covered include probability, random variables, expectation, moment generating functions, discrete and continuous distributions, limit theorems, maximum likelihood and Bayesian estimation, confidence intervals, hypothesis tests, Neyman-Pearson lemma, t and F tests.

### **Evaluation:**

Homework - 20%

Exam I - 25%

Exam II - 25%

Final exam - 30%

**Homework:** Homework will be assigned regularly. Late assignments will NOT be accepted. Students are required to write clear and detailed answers to all homework problems. You are encouraged to discuss homework problems with other students but you have to prepare and present your own solutions. Feel free to ask me for help after you have made an attempt to solve the problems. Do not copy any part of a homework.

**Exams:** There will be two midterms and one final exam. All exams are in-class and closed book. For each exam (including the final exam) you are allowed to bring two 8.5"x11" sheets of handwritten notes (both sides) and a scientific calculator (something similar to a TI-83). You will not be allowed to use your cell phone, tablet, laptop, smart watch, or any other device with capability to connect to the Internet, or to other devices. The final exam will be comprehensive. Statistical tables will be provided for all exams as needed.

**Makeup exams:** If you absolutely need a makeup exam and have a valid excuse, please see me for the necessary arrangements. However, you must notify me in advance in such a situation. A make-up exam must be taken within a week of the missed exam. Exceptions to this policy will be permitted only in extreme situations such as serious injury immediately prior to an exam or severe illness requiring hospitalization.

**Full credit on homework and exam problems:** You need to show your justification for work on each homework or exam problem. Answers without work will not receive full credit.

**Course attendance policy:** You are expected to attend all lectures and recitations. Formal attendance records will not be kept, however, students are responsible for all material covered in class. Office hours should not be used for instruction on material that has already been covered in class.

**Academic Misconduct:** It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

In particular, please note that although students are encouraged to work together on homework assignments, all students must submit their own written work **IN THEIR OWN WORDS**.

**E-mail Correspondence:** In order to protect your privacy, all course e-mail correspondence must be done through a valid OSU name.nn account. If you have not activated your OSU email account, you can activate your account at <https://acctmgt.service.ohio-state.edu/cgi-bin/KRB1EntryAdd>.

**Special Accommodations:** The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

## Tentative Schedule

Meeting No.	Date(Day)	Topic	Textbook Readings
1	8/21/19(W)	Calculus review	
2	8/23/19(F)	Intro to probability	1.1 - 1.4
3	8/26/19(M)	Sample spaces, events	1.4 - 1.6
4	8/28/19(W)	Counting, assigning probabilities	1.7 - 1.10
5	8/30/19(F)	Conditional probability	2.1
	9/2/19(M)	LABOR DAY - NO CLASS	
6	9/4/19(W)	Independence, Bayes theorem	2.2 - 2.3
7	9/6/19(F)	Independence, Bayes theorem	2.2 - 2.3
8	9/9/19(M)	Random variables and discrete distributions	3.1
9	9/11/19(W)	Continuous distributions, cdfs	3.2 - 3.3
10	9/13/19(F)	Continuous distributions, cdfs	3.2 - 3.3
11	9/16/19(M)	Bivariate distributions	3.4
12	9/18/19(W)	Conditional and marginal distributions	3.5 - 3.6
13	9/20/19(F)	Multivariate distributions	3.6 - 3.7
14	9/23/19(M)	Functions of random variables	3.8 - 3.9
15	9/25/19(W)	<b>EXAM #1*</b>	Chapters 1 - 3
16	9/27/19(F)	Expectation	4.1
17	9/30/19(M)	Expectation	4.1 - 4.2
18	10/2/19(W)	Variance	4.3
19	10/4/19(F)	Moments, Means, Medians	4.4 - 4.5
20	10/7/19(M)	Covariance and correlation	4.6
21	10/9/19(W)	Conditional expectation	4.7
	10/11/19(F)	FALL BREAK – NO CLASS	
22	10/14/19(M)	Bernoulli, Binomial, Hypergeometric distributions	5.1 - 5.3
23	10/16/19(W)	Poisson, Negative Binomial, Normal distributions	5.4 - 5.6
24	10/18/19(F)	Normal distribution	5.6
25	10/21/19(M)	Normal and Gamma distributions	5.6 - 5.7
26	10/23/19(W)	Beta and Multinomial distributions	5.8 - 5.9
27	10/25/19(F)	Bivariate normal	5.10

28	10/28/19(M)	Law of large numbers	6.1 - 6.2
29	10/30/19(W)	Central limit theorem	6.3
30	11/1/19(F)	Sampling distributions	Ch. 6
31	11/4/19(M)	Statistical inference, maximum likelihood	7.1, 7.5
32	11/6/19(W)	<b>EXAM #2*</b>	Chapters 4 - 6
33	11/8/19(F)	Maximum likelihood	7.5 - 7.6
	11/11/19(M)	VETERAN'S DAY – NO CLASS	
34	11/13/19(W)	Bayesian estimation	7.2 - 7.4
35	11/15/19(F)	Bayesian estimation	7.4
36	11/18/19(M)	Sampling distributions, $\chi^2$ distribution	8.1 - 8.3
37	11/20/19(W)	t distribution, confidence intervals	8.4 - 8.5
38	11/22/19(F)	Unbiased estimation	8.7
39	11/25/19(M)	Intro to hypothesis testing, simple hypotheses	9.1 - 9.2
	11/27/19(W)	THANKSGIVING BREAK – NO CLASS	
	11/29/19(F)	THANKSGIVING BREAK – NO CLASS	
40	12/2/19(M)	t-tests, comparing two means	9.4 - 9.6
41	12/4/19(W)	<b>Course summary &amp; review</b>	All material

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\*Please note that exam dates are tentative and may be adjusted depending on the pace of the course.

**FINAL EXAM:** Monday, December 9, 8:00 - 9:45am

**Version: August 18, 2019**