

Instructor.

Name: Meghan Tooman

Office: LD 249 (LD: Science Building) Email: mtooman@iupui.edu**Course.**

Prerequisite: MATH 16500 or equivalent (basic differential and integral calculus)

Textbook: Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye (2016) *Probability and Statistics for Engineers and Scientists*, 9th edition.

Lectures: TR 4:30 – 5:45 PM in LD 002

URL: <https://iu.instructure.com/courses/1580260>

Office hours. MW 03:00–04:00 PM, LD 270B. Additionally, free tutoring for this class is available at the MAC (<http://mac.iupui.edu/>).

Course summary. 3 credits. A data-oriented introduction to the fundamental concepts and methods of applied statistics. The objective is to acquaint the students with the essential ideas and methods of statistical analysis for data in simple settings. In this class students will develop both theoretical and practical skills. Topics include: basic probability theory; random variables; law of large numbers; Normal distribution; Central Limit Theorem; statistical estimation; hypothesis testing; confidence intervals; simple linear regression; analysis of variance (ANOVA).

Grades.

Quizzes	(20 pts \times 7 = 140 pts)
Attendance	(40 pts)
Homework	(20 pts \times 7 = 140 pts)
Mini R Projects	(80 pts \times 2 = 160 pts)
Midterm Exam	(150 pts)
Final Exam	(250 pts)

- Quizzes. There will be 8 closed book quizzes. Quizzes will be based on lecture examples and homework problems. To allow for illness, family emergencies, etc., your lowest score of quiz will be dropped.
- Homework. There will be 8 homework assignments throughout the semester, covering roughly the material of Chapters 1 - 13 from the textbook (except Chapter 7, 12). The homework solutions will be provided at the same day as your submission. And therefore, **late homework will not be accepted under any circumstances**. Staple your homework! No e-format. Do not slip your homework into the instructor's office. To allow for illness, family emergencies, etc., your lowest score of homework will be canceled. Homework performs three vital functions in this course:
 - it gives you an opportunity to practice what you have learned and to understand concepts by actually using them;*
 - it gives you feedback on what you understand and on what areas need more work;*

iii. it contributes to your final grade.

You are encouraged to use homework as a learning tool. The homework assignments are quite lengthy and I recommend that you get an early start on them and do a few problems each day. You may also wish to discuss homework with your classmates. Group discussions and study sessions can be a useful tool for learning. However, outright copying is unacceptable, as well as pointless, and will be penalized. A good rule of thumb is that it is fine for you to talk with others about how to do a problem, but then go and write it up yourself, possibly comparing answers afterwards if you are unsure. Remember that if you copy from a classmate without understanding it, only your classmate will pass the exam. If blatant copying is detected, all parties involved (copier and copied) will receive a score of zero for that assignment. This type of behavior will also be reported to the school.

- Mini R projects. There will be one data analysis project and one simulation project that students complete using the most popular statistical software R. In “real life” no one analyzes data by hand. Therefore, to have a solid background in statistics and data analysis, you should be familiar with a statistical software package. The projects will help you do so. **No late projects will be accepted.**
- Exams. There will be 1 midterm exam and 1 cumulative final exam. Exams are closed book, and will have some routine problems as well as some more challenging problems. Review problems will be provided to help you prepare, and you are allowed one page (8.5×11 , two-sided) of cheat sheet for each exam. Cell phone use is not allowed during an exam. All answers should be circled. Please do not use pencil for exams. Otherwise, the mistakes made by the grader or the instructor won’t be corrected!
- Overall course grades will be assigned according to the following rule:

$$A \geq 90\% > B \geq 80\% > C \geq 70\% > D \geq 60\% > F,$$

with “+” and “–” attached for scores falling in the upper and lower third of the range, respectively. I reserve the right to make adjustments to the overall grading policy, but the letter grade cutoffs will be no stricter than those advertised above. Department policy requires that students must pass the final exam to pass the course.

- **No make up** is allowed for any quiz or project. Makeup of the Midterm exam may be given in only a very special (and documented) circumstance, such as: the death of a family member, religious observances, sickness, hospitalization, military duty or the like. The details for course-wide makeup exam will be given after the Midterm. Those students who will not be able to take and complete the final exam for similar reasons, may be assigned—if appropriate – an Incomplete grade of I in the course.
- Incompletes. Grades of Incomplete will only be given in accordance with university policy¹. Specifically, students must be passing at the 3/4 mark of the semester to qualify for assigning an incomplete. The instructor must agree that an incomplete is appropriate and it must be approved by the Associate Chair of the Department of Mathematical Sciences.

Software and Calculator. This course uses the R statistical software. This software is available on all university PCs, but you can download it for your own computer since it is open source and free. Here is the link for R: <https://www.r-project.org/>, where you can find R availability, online help, and other info. No previous R experience is assumed—online tutorials

¹See <http://www.registrar.iupui.edu/incomp.html>

are available by searching in Google or Youtube. RStudio (<https://www.rstudio.com/>) is the powerful and productive user interface for R, which is also free and open source. **Throughout this course, we will use calculator TI84. And everyone needs to have it.**

Points of interest. Remarks to help answer some questions you may have.

- Attendance is required.
- Course announcements, documents and grades will be posted on Canvas.
- Projects should be turned in to the instructor **in class** in the form of **hardcopies**. No E-copy or late projects will be accepted.
- You have no reason to be in contact with the graders for this course. If you have questions about the grading, please speak with your instructor about it.
- You may discuss project problem with your classmates, but you must write up and submit solutions independently.

Accommodations². Students needing accommodations because of a disability will need to register with Adaptive Educational Services (AES) and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 274-3241.

Dishonesty and Student Misconduct. Cheating will result in a minimum penalty of receiving a grade of F in the course. The IUPUI Department of Mathematical Sciences expects all students to adhere to the regulations put forth in the “IUPUI Code of Student Rights, Responsibilities, and Conduct” concerning academic misconduct or personal misconduct. Procedures for imposing academic and disciplinary sanctions are outlined in the Code³.

Campus Wide Policies Governing the Conduct of Courses at IUPUI⁴. There are links to specific policies in the general areas of attendance, academic policy, conduct and related policies.

Administrative Withdrawal. A basic requirement of this course is that you will participate in all class meetings and conscientiously complete all required course activities and/or assignments. Keep in touch with me if you are unable to attend, participate, or complete an assignment on time. If you miss more than half of the required activities within the first 25% of the course without contacting me, you may be administratively withdrawn from this course. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund.

Withdrawals. If you decide to withdraw from the course, be sure to process all paperwork by the appropriate deadlines outlined in the following table⁵: After the 3/4 mark of the semester, course instructors cannot sign a drop slip. The student must see the Associate Chair of the Department of Mathematical Sciences. The School of Science Dean’s Office will not endorse a withdrawal after the 3/4 mark of the semester for students unless an extremely serious and documentable excuse is established.

² See <http://aes.iupui.edu/> for more information

³ See <http://www.iupui.edu/code/>

⁴ See http://registrar.iupui.edu/course_policies.html

⁵ Official details can be found at <http://registrar.iupui.edu/accal.html>

Times	Signatures Required
First Week	None
After First Week	Advisor
1/2 mark of Semester	Advisor and Instructor
3/4 mark of Semester	Associate Chair, LD 270

Table 1: **Tentative Schedule**

Week	Date	Day	Due	Contents	Readings
01	08/23	T		Introduction; data; Intro to R	1.1,1.2,1.5
	08/25	R		Numerical summaries of data	1.3,1.4
02	08/30	T		Graphical summaries of data	1.6
	09/01	R	Extra	Regression	11.1–11.3
03	09/06	T		Working Class	
	09/08	R	HW1	R Demonstration	
04	09/13	T	Q1	Probability axioms; applications	2.1,2.2,2.4
	09/15	R		Counting methods; properties	2.3,2.5
05	09/20	T	P1	Conditional probability;	2.6
	09/22	R		Bayes theorem; independence	2.7
06	09/27	T	HW2	Random variables; CDFs; PMF	3.1,3.2
	09/29	R	Q2	PDF	3.3
07	10/04	T		Expected value; Variance; independent RVs	4.1–4.3
	10/06	R	HW3	Binomial; Hypergeometric; Poisson	5.1–5.3,5.5
08	10/11	T	Q3	Uniform; Exponential	6.1,6.6
	10/13	R		Normal random variables	6.2–6.4
09	10/18	T		Fall Break	
	10/20	R	HW4, Q4	Review for Exam 1	
10	10/25	T		Exam 1	
	10/27	R		R for sampling; Sampling distributions;	8.1–8.3
11	11/01	T		CLT	8.4
	11/03	R		More CLT exercises; t-distribution;	8.4,8.6
12	11/08	T	HW5	Confidence intervals for a mean	9.1–9.5
	11/10	R	Q5	More confidence intervals for a mean	9.5
13	11/15	T	P2	Two-sample CIs	9.8–9.11
	11/17	R	HW6	Hypothesis tests for a mean	10.1–10.4
14	11/22	T	Q6	Power problem	10.1–10.4
	11/24	R		Thanks giving break	
15	11/29	T		More hypothesis tests for a mean	10.6,10.8
	12/01	R		Two-sample hypothesis tests	10.5,10.9
16	12/06	T	HW7	ANOVA and More regression	11.4,11.5,13.1
	12/08	R	Q7	Review for Final Exam	
17	12/13	T		Final Exam (3:30 – 5:30 PM) in lecture room	