

INQ 240-C, Fall 2018: Statistics and Food

Instructor Maggie Rahmoeller *Office:* Trexler 270J
Email: rahmoeller@roanoke.edu *Phone:* (540) 375-2505

Class Meetings INQ240-C
MWF 2:20-3:20PM
Trexler 263

Office Hours By appointment only through <https://drmaggie.youcanbook.me/>:
Mon 9:00AM-10:00AM, 3:30PM-4:30PM Thurs 3:00PM-4:00PM
Tues 3:00PM-4:00PM Fri 3:30PM-4:00PM
Wed 9:00AM-10:00AM

NOTE: You can book up to 4 days in advance but have to book at least 2 hours before the time slot. Email me if none of these times work.

Course Description Do you like food? Are you interested in issues concerning topics such as food industry, personal dietary choices, food marketing, and food shortages? In this course, you will learn how statistical methods are used to provide arguments for such issues and explanations for patterns that arise in the US today. And of course, food will be involved. You will read and reflect on articles involving food, and use and create data sets concerning food.

Course Information This is a course in learning how to obtain and interpret results obtained from sets of data by using techniques of statistics. This class will introduce to you the methods of collecting, organizing, and presenting data. You will also study various quantitative measures for data and will study how to draw conclusions and make inferences from that data. Some probability will also be discussed as a precursor to the “inferential” statistics.

Intended Learning Outcomes By the end of this course, successful students will be able to:

- use the methodologies of statistics to investigate a topic of interest and make decisions based on the results,
- use the methodologies of statistics to design and carry out a simple statistical experiment,
- use the methodologies of statistics to critique news stories and journal articles that include statistical information. In the critique students will recognize variability and its consequences, identify potential sources of bias and both proper and improper cause and effect inference,
- articulate the importance and limitations of using data and statistical methods in decision making,
- write about course topics clearly and effectively, and
- interpret quantitative information related to the course topic.

Required Materials **Textbook:** *Introductory Statistics*, by Barbara Illowsky, Susan Dean, etc; free, online text from OpenStax: <https://cnx.org/contents/30189442-6998-4686-ac05-ed152b91b9de>
Technology: Minitab Express (\$30, download 6-month rental from www.onthehub.com/minitab)
Reference Book: *A Writer’s Reference* by Diana Hacker, RC Edition OR *Easy Writer*, 6e, by Lunsford
Calculators: Any scientific calculator to perform calculations
Other: Other readings will be provided as needed

Course Grades The following table lists the weights for the various forms of assessment for this class.

Activities & Homework	10%
Projects	25%
Mastery Topics	65%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below:

		B+	87-89	C+	77-79	D+	67-69		
A	93-100	B	83-86	C	73-76	D	63-66	F	0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62		

Attendance & Make-Up Work

Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. Unexcused absences may result in the lowering of the final grade (for example, a B to a B-). When absent, excused or unexcused, you are responsible for all material covered in class. **You will not be allowed to make up any work missed due to an unexcused absence.** Should you miss a class or part of a class, email or talk to me as soon as possible to see if anything can be done to help you catch up. If you have **more than two unexcused absences**, you will be **dropped from the class after being sent a warning notice.**

This course expects you to spend **at least 12 hours** on work each week inside and outside of class.

Reading

Daily reading of assigned sections from our textbook is expected. You should come to class prepared to discuss the material that you have read. You can find an approximate schedule for the sections we will cover on the last page of this syllabus. Readings from other sources will be assigned as appropriate.

Homework

Homework will be assigned almost every class period, and graded on completeness. Completeness includes using complete sentences, restating each problem in your answers, and explaining your answers.

Projects

There will be three major projects in this class that are designed to allow some freedom for you to explore the connection between statistics and food in the US.

The first two of these assignments will be papers (roughly 2 - 3 pages), and the first paper will focus on critiquing the use of descriptive statistics in an assigned article and discussing potential bias and other issues in the described study. The second paper will be based on studies involving diets.

The final assignment will take much of the rest of the semester. This will consist of a food experiment and a formal written report. You will work in small groups to conduct a cooking experiment and use statistical methods to determine significant findings. For example, if your group has access to an oven, you could use statistics to determine whether the amount of leavening agent in biscuit dough affects the average height of the biscuit. If your group only has access to a microwave, you could instead use statistics to determine whether the flavor of microwave popcorn affects the number of unpopped kernels, for example.

Academic Integrity

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No electronic devices other than calculators can be taken out during any class or testing period (this includes cell phones) unless written consent is given by the professor (e.g. Minitab Express will be allowed for some tests). Note that looking at or using your cell phone during a test or quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so.

Tests

We will use **Mastery-Based Testing** rather than **Points-Based Testing**. Mastery-based testing is very different from what you are used to - do not hesitate to ask me questions!

Description: You will only receive credit for answers that demonstrate you completely understand (have mastered) a topic. But you will get MANY chances to display mastery throughout the semester with NO PENALTY for earlier attempts.

- The course has been summarized by 16 topics.
- Your mastery of questions on these topics is assessed through the working of problems each week and during the final exam period.
- Each problem submitted is graded as either “Mastered” or “Not Mastered”. A grade of Mastery indicates that you have demonstrated full understanding of the concept being tested and further work on the topic is unnecessary.
- Once you have mastered a topic, you need not attempt it again.
- There is no penalty for multiple attempts taken to achieve mastery.
- **Mastery does not mean perfect!** It means you understand and can demonstrate all fundamentals of the topic and are proficient at the level desired for the course - you do not need to study the topic further.

Your overall test grade is determined by the number of topics you have mastered:

# Mastered	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mastery Grade	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25

MCSP Conversation Series

The Department of Mathematics, Computer Science and Physics offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our discipline. Members of this class are invited to be involved with all of these meetings; however participation in **at least one** of these sessions is mandatory. After attending, students will submit a one page paper **within a week** reflecting on the discussion. This should **not** simply be a regurgitation of the content, but rather a **personal contemplation of the experience**. This does not have to be a formal paper. This reflection paper will be counted as a homework assignment.

Accessible Education Services

Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment.

Subject Tutoring Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm - 9 pm, Sunday - Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are highly trained Roanoke College students who offer one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences. Tutoring sessions are available in 15, 30, or 45-minute appointments. Feel free to drop by for a quick question or make an appointment at https://libguides.roanoke.edu/subject_tutoring for a longer one-on-one appointment. For questions or concerns, please contact us at 540-375-2590 or subject_tutoring@roanoke.edu.

Writing Center Roanoke College's Writing Center is located on the Lower Level of Fintel Library and offers writing tutorials focused on written and oral communication for students working on writing assignments/projects in any field. Writers at all levels of competence may visit the Writing Center at any point in their process, from brainstorming to drafting to editing, to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 pm. Simply stop in, or schedule an appointment by going to www.roanoke.edu/writingcenter, where our schedule of writing workshops and creative writing playshops is also posted. Questions? Email writingcenter@roanoke.edu or call 375-4949. Like our Facebook page for updates!

Tentative
Schedule

Wed	Aug 29		Intro
Fri	Aug 31	Topic 1 - Sections 1.1-1.4	Experimental vs Observational Studies
Mon	Sept 3	Topic 1	Experimental vs Observational Studies Project 1 Assigned
Wed	Sept 5	Topic 1	Data Collection
Fri	Sept 7	Topic 2 - Sections 2.1-2.2	Visualizing Data
Mon	Sept 10	Topic 3 - Sections 2.3-2.7	Descriptive Statistics
Wed	Sept 12		Wrapping up Topics 2 & 3 Project 1 Due
Fri	Sept 14	Mastery Opp	Topics 1-3
Mon	Sept 17	Topic 4 - Ch 3	Probability
Wed	Sept 19	Topic 4	Probability Project 2 Assigned
Fri	Sept 21	1/2 Mastery Opp & Topic 5	Topics 1-3 & Probability
Mon	Sep 24	Topic 5 - Sections 4.1 & 4.3	Binomial Distribution
Wed	Sep 25	Topic 5 & Topic 6 - Section 5.1 & Ch 6	Binomial & Normal Distributions
Fri	Sept 28	1/2 Mastery Opp & Topic 6	Topics 1-5 & Normal Distribution
Mon	Oct 1	Topic 6 & Topic 7 - Ch 2 & 7	Normal Distn & Central Limit Theorem
Wed	Oct 3	Topic 7	Central Limit Theorem Project 2 Due
Fri	Oct 5	Mastery Opp	Topics 1-6
Mon	Oct 8		Intro to Inference
Wed	Oct 10	Topic 8 - Ch 8	Confidence Intervals Project 3 Assigned
Fri	Oct 12	1/2 Mastery Opp & Topic 8	Topics 1-7 & Confidence Intervals
Fall Break			
Mon	Oct 22		Intro to Hypothesis Testing
Wed	Oct 24	Topic 9 - Ch 9	Testing for 1 Mean Project 3: Groups & Topics Due
Fri	Oct 26	Topic 10 - Ch 10	Testing for 2 Means
Mon	Oct 19	Topic 11 - Ch 13	ANOVA
Wed	Oct 31		Recap on Testing Means
Fri	Nov 2	Mastery Opp	Topics 1 - 10 Project 3: Introduction Due
Mon	Nov 5	Topic 12 - Ch 9	Testing for 1 Proportion
Wed	Nov 7	Topic 13 - Ch 10	Testing for 2 Proportions Project 3: Experimental Design & Supply List Due
Fri	Nov 9	Mastery Opp	Topics 1-12
Mon	Nov 12	Topic 14 - Ch 11	Chi-Square Testing
Wed	Nov 14	Topic 14	Chi-Square Testing
Fri	Nov 16	Mastery Opp	Topics 1-13
Mon	Nov 19		Project 3 In-Class Work Day
Thanksgiving Break			
Mon	Nov 26	Topic 15	Choosing an Appropriate Test
Wed	Nov 28	1/2 Mastery Opp & Topic 15	Topics 1-14 & Choosing a Test Project 3: Data & Visuals Due
Fri	Nov 30	Topic 16 - Ch 12	Scatterplots & Regression
Mon	Dec 3	Topic 16	Scatterplots & Regression
Wed	Dec 5		Review
Fri	Dec 7	Mastery Opp	Topics 1-16
Tues	Dec 11	Mastery - All Topics	Final Exam: 2-5PM, Trexler 263

Notes for when reading textbook:

- Always read introductions for chapters.
- For Topic 2, ignore pg 20-21 (stratified/cluster/systematic sampling). And for section 1.3, read pg 28-35 (frequency) only.
- For Topic 3, ignore line graphs, frequency polygons, time series, calculating mean of grouped frequency tables, and calculating standard deviation.
- For Topic 4, skip section 4 and in section 6, ignore numerical identification of outlier (pg 694).
- For Topic 8, in chapter 2 only read section 5, pg 105-106 (Law of Large #'s & Mean Sampling Distribution). For chapter 7, only read section 1 and 3 (pg 405).
- For Topic 9, in chapter 8 skip pg 451 and 463 (calculating sample size n) and pg 460 ("Plus 4" confidence intervals for p).
- For Topics 10 and 11, skip section 2.
- For Topics 12 and 13, skip sections 2 and 4.
- For Topic 14, skip sections 4 & 6 and in section 5, skip homogeneity.
- For Topic 16, skip section 4.