E370(11959): Statistical Analysis For Business and Economics
Spring 2020

Instructor: Seokil Kang

Time and Location: Tue, Thu 2:30pm to 3:45pm, Student Building 221

Contact: sk86@iu.edu or CANVAS message

Office Hours: Wed 2:00-3:30pm WY310 and by appointment

** **Disclaimer:** Syllabus is a plan-and even a contract!, but everything is subject to change. The syllabus will be updated accordingly, so please keep checking the syllabus on CANVAS.

Overview and Objectives

The overall goal of this course is to introduce you to the discipline of statistics as a science of understanding and analyzing economic data and not as a branch of mathematics. The class is designed to *provide you with the tools* needed to answer real-world questions and better understand the process of scientific research and statistical inference in economics. While a good understanding of these universal statistical tools is its own reward and can find applications in many areas[1], our course will mostly discuss examples pertaining to economics and business world (you are welcome to think about other applications and consult with me if necessary). Additionally, our focus in this course is *the tools* and not an in-depth analysis of a specific field of economics. Therefore, be ready to see examples from different economic areas (health, education, labor, etc.).
Our journey will start from graphical, tabular and numerical summaries of different types of data and will take us through the topics of probability theory, population and sampling distributions, hypothesis testing, and regression analysis.

At the completion of the course, you are expected to be able to:

- Translate between plain English and statistical terminology before applying any statistical tools. In other words, you are expected to be able to identify a key information in the description of the economic problem and write down this information in statistical language/notation (regardless of the wording of the economic situation);
- Select a suitable statistical approach to analyze new situation;
- Represent the data using tables and graphs, and summarize data using a variety of numerical measures;
- Understand (and implement) the process of statistical inference;

[1] For example, by introducing a variety of ways to summarize data in the large datasets, our course develops data analysis and presentation skills, and teaches you to express ideas in the language broadly understood by the researchers in different areas.

- Understand (and perform) basic model building using regression tools;
- Understand the role of the underlying assumptions in statistical analyses;
- Use Excel to calculate numerical measures to analyze the data and proficiently read outputs produced by Excel add-ins;
- Interpret quantitative results with various levels of statistical details for the audience (interpret using statistical terminology for the audience familiar with statistics and using plain English for those who do not have a special training in statistics).

Prerequisites

E201 (or S201) and M118 (or A118, or X118, or D117, or S118) are required. M119 and E202 are recommended, but not required. A diligent attitude towards class and CANVAS is a necessary requirement.

Recommended Texts & Materials

Recommended Textbook: Robert A. Donnelly. *Business Statistics*, Pearson. 3rd Edition, 2019 (ISBN-13: 978-0134685267).

You are free to purchase any version (kindle, ebook, print book) of the textbook you prefer. Be advised that earlier edition of the textbook suits for studying the theoretical concepts of our class. However, examples and practice problems may be significantly different.

Two copies of the textbook(2nd edition) are available on reserve in Herman B Wells Library. Note that 'on reserve' means that the textbook can be checked out only for 4 hours[2]. Therefore, this opportunity provide only a limited access to the textbook, but it proved to be useful if you study in the library or need access/copy of the selected topics.

Software: To perform cumbersome calculations, our class will utilize *Microsoft Excel* (Office 2011 or later is recommended). Excel 2016 can be accessed for free through IUB Citrix Cloud (`https://uits.iu.edu/iuanyware`). Alternatively, you can download Microsoft Office through IUB at `https://iuware.iu.edu/`, which includes Excel for your platform.

Computers and Other Devices: The course is designed to use computer software during the class, and the classroom is equipped accordingly. Class slides include information relevant to Excel activities (screenshots, Excel's function descriptions, etc.). Excel files with the solutions to the exercises solved in class will also be posted on Canvas.

[2]Reserve items are listed in IUCAT and may be located using Course coordinator's name (Prof. Nastassia Krukava) or Course Name. On the main IUCAT page, click on the link that says "Reserves" under the Search field.

Assessments

1. **Attendance:** The class will use **Top Hat** classroom response system for taking attendance. You will be able to confirm your presence in the classroom using your smartphones, tablets, laptops, or through text messages.

   The attendance on Top Hat will be taken through the "Secure Attendance" option which verifies student's geolocation and/or proximity. To ensure that your attendance is registered correctly in the system, please make sure that the bluetooth is turned on on your mobile device (for more detailed information, please see the *Student: Secure Attendance* article at https://support.tophat.com/s/article/Student-Secure-Attendance).

   To enroll into Top Hat, please enter Top Hat through the link on Canvas. This is the only way to ensure that your Top Hat account and your Canvas are properly linked. Please visit the *Student: Indiana University Quick Start Guide* (https://support.tophat.com/s/article/Student-Indiana-University-Quick-Start-Guide) within the Top Hat Success Center which outlines how to register for a Top Hat account and provides a brief overview to get you up and running on the system[3]. Any attempts to boost the grade by manipulating attendance records on Top Hat are viewed as an academic misconduct. Specifically, if it is discovered that student's attendance is registered on Top Hat but the student is not present in the classroom, no points for attendance will be given towards the final grade (even if the student was caught once). Also, all extra credit will not be taken into account. Additionally, the student becomes a subject to a disciplinary action as described in the IU *Code of Student Rights, Responsibilities, & Conduct*.

   It is understandable that sometimes there are important events that one just cannot miss. Or even sometimes a rest can be a good way to improve one's academic performance. Thus, there will be no penalty for the first four absences with any reason. Students are welcomed to use these bonuses. But after the fourth absence, each absence will be counted normally. Still students can ask the instructor about valid excuses beforehand but they must be followed by official documents of proof with zero ambiguity. In regarding to a health condition issue(*e.g.* long-term hospitalization, concussion, *etc*), please discuss with me ASAP. Only the following reasons are acceptable in advance.

   (1) Pass away of the direct family with official notice.

   (2) Accommodations will be made for students with religious holidays provided that the student notifies me early in the semester (no later than January 30). Students seeking accommodations for religious observances can find the necessary form, policy statement and calendar of religious holidays at https://studentaffairs.indiana.edu/dean-students/attendance-concerns.shtml.

[3]Should you require an assistance with Top Hat to troubleshoot technical issues, please contact their Support Team directly by way of email (support@tophat.com), the in-app support button, or by calling 1-888-663-5491.

(3) Accommodations will be made for students who miss the class because of university-sanctioned activities according to IUB Policy for University Approved Curricular and Extracurricular Activities (https://studentaffairs.indiana.edu/doc/news/2017-missed-exam-policy.pdf). If you are participating in a university-sanctioned activity, please let your instructor know as early in the course as possible so that accommodations can be made (beginning of the semester or at least two weeks in advance of the absence).

For other reasons, Instructor will consult with the department. Please use the free absence chances wisely.

2. **Assignments:** You will be given 9 homework assignments. Completing all assignments is *absolutely necessary* for successful learning of the class material. However, only 8 highest score HWs will be counted towards your final grade. A tentative deadline is set for each homework (see the schedule below) which has to be submitted electronically through Canvas before the deadline. Majority of the HWs (except HW 9) are planned with a deadline on Sunday at 11:59PM. But specific date and time depend on our progress in the class and will be announced in class and on Canvas. No late HW submissions will be accepted and, therefore, will result in zero points. Discussion of the HWs with peers is permissible, may be highly beneficial and is encouraged. However, homeworks submitted for the grade should represent your own work. Note that **offering** and **accepting** ready solutions from others is an act of plagiarism, which is a serious offense and **all involved parties will be penalized**.
3. **Exams**: Exam dates are NOT a subject to change and are indicated below.
MAKE SURE THAT YOU DO NOT HAVE ANY CONFLICTS WITH THESE DATE!

Midterm Exam 1	**Feb 13 (Th)**
Midterm Exam 2	**Mar 12 (Th)**
Midterm Exam 3	**Apr 16 (Th)**
Final Exam	**May 5 (Tu), 10:15am – 12:15pm**

Topics covered on the midterms will be specified prior to each exam. The Departmental Final Exam is comprehensive and covers all topics discussed in the class. Accommodations in the form of a make-up exam will be granted to students who miss the test because of 1) official religious holidays for which the work is not allowed; 2) university-sanctioned activities (more information is provided in the section on policies below); 3) unforeseen medical emergency supported by a proper documentation as mentioned earlier. Responsibility will rest with the student to inform me *in writing* and *in advance* (at least one week) of the missed exam, so that accommodations can be made. For unforeseen absences, you must inform me in writing no later than *one week* after the exam. If your absence qualifies for a make-up exam, you will be required to coordinate with the instructor for the date and time and complete the make-up exam within *one week* of the original exam date. While the topical coverage of the make-up exam is guaranteed to be the same as for the

rest of the class, make-up exam may be given in a different format (e.g, multiple choice questions may be substituted with short answer questions). It is imperative that your schedule permits you to take the final exam. Students who fail to attend the final exam because of catastrophic (and documented) occurrence, which is beyond the student's control and necessitates their absence, and who have a passing grade up to that point should contact me as soon as possible. Remember that the make-up exam is not a guaranteed service, especially the final. **Please bring your Indiana University ID to each exam**.

Grading Policy

Your course grade will be based on the **total score** (out of total **1,000 points**) you earn for:

- **Final Exam** (comprehensive, multiple choice, maximum **270 pts**);
- **Three midterm exams** Maximum 174 pts for each exam or **522 pts** in total);
- **Eight homework assignments** (maximum 20 pts for each HW or **160 pts** in total). There will be nine homework assignments in total, each worth 20 pts. The lowest homework score will be dropped and eight best scores will be counted towards your final grade;
- **Class attendance** (maximum **48 pts**).

Extra Credit: Occasional extra credit activities are possible(NOT GRANTED!). Extra credit points will be added to the total score you earn in the class and, therefore, should be regarded as an opportunity to improve your grade (you should not, however, expect that it will be a significant portion of the grade). The extra credit activities may include, but are not limited to, extra credit questions on the HWs and exams.

Grading System

The final letter grade for the course will be based on the following scale:

A+	(970 - 1000)	B+	(870 - 899)	C+	(760 - 789)	D+	(620 - 649)	F	(Below 500)
A	(920 - 969)	B	(820 - 869)	C	(680 - 759)	D	(550 - 619)		
A-	(900 - 919)	B-	(790 - 819)	C-	(650 - 679)	D-	(500 - 549)		

I reserve the right to make *advantageous* adjustments of this scale in student's favor. However, you should not rely on a possibility of such adjustment when forming your expectations because curving is neither guaranteed nor is a regular practice in this course. Scores on the border of the letter grade are decided in student's favor towards the higher letter grade. Please, note that this bumping up rule applies only to **the points** on the border of the letter grade, but not the percentage. Except for the final exam, any concerns regarding grades both for the homeworks and exams must be contested **within a week** of posting. The window to address such concerns for the final exam will be announced later (but you should expect it to be shorter than a week). The scores become a permanent part of your record if not contested.

Administrative Issues and Academic Misconduct

This course follows the policies provided by Indiana University. For class administrative rules visit student center https://one.iu.edu/task/iu/student-center. Students are responsible to be well acquainted with the university policies which are outlined in the *Code of Student Rights, Responsibilities, & Conduct*. Policies and regulations of the class that are not specified explicitly in the syllabus will also be subject to *Code of Student Rights, Responsibilities, & Conduct* and if needed, official announcement by the instructor will be made. *Academic misconduct* is defined as any activity that tends to undermine the academic integrity of the institution. The university may discipline a student for academic misconduct. Academic misconduct may involve human, hard-copy, or electronic resources. Details are followed in http://studentcode.iu.edu/responsibilities/academic-misconduct.html. The penalty of any academic misconduct is the grade of F at minimum with zero tolerance.

Important Dates

Course Deadlines: You are responsible for changing your status in the course (drop or withdraw) within school established time period. I will not be able to drop the course for you if you miss the deadline. Some important deadlines are listed below and additional information is available at https://registrar.indiana.edu/official-calendar/official-calendar-spring.shtml.

Add/Drop Deadline (no W grade)	Jan 19, 2020
Course Withdrawal Deadline (automatic W)	Mar 15, 2020
Complete Session Withdrawal Deadline	May 1, 2020

Other Important Dates:

Spring Break	March 15 – March 22, 2020 (no classes)

Tentative Course Outline

The followings are mainly from the contents of the main textbook. These can be regarded as the overall outline of this course. We will go through this stream up to limited time. However, it may be revised depending on the schedule of the course, except the schedule for exams.

Week	Topic	Reading	Assignment Due
Week of 01/13	Introduction. Statistics and Data.	Ch. 1	
Week of 01/20	Displaying Descriptive Statistics for a Single Variable.	Ch. 2	
Week of 01/27	Calculating Descriptive Statistics, Single Variable and Two Variables.	Ch. 3	HW 1
Week of 02/03	Introduction to Probability. Discrete Probability Distributions (Binomial Distribution).	Ch. 4–5	HW 2
Week of 02/10	Discrete Probability Distributions (Binomial Distribution).	Ch. 5	HW 3; Exam 1 (Th)
Week of 02/17	Continuous Probability Distributions (Normal Distribution).	Ch. 6	
Week of 02/24	Sampling and Sampling Distributions.	Ch. 7	HW 4
Week of 03/02	Interval Estimation.	Ch. 8	HW 5
Week of 03/09	Interval Estimation.	Ch. 8	HW 6; Exam 2 (Th)
Week of 03/16	NO CLASSES (Spring Break)		
Week of 03/23	Hypothesis Testing, Single Parameter (Mean).	Ch. 9	
Week of 03/30	Hypothesis Testing, Single Parameter (Mean and Proportion).	Ch. 9	
Week of 04/06	Inference About Parameters with Two Populations. Introduction to Regression Analysis.	Ch. 10, 14	HW 7
Week of 04/13	Simple Linear Regression.	Ch. 14	HW 8; Exam 3 (Th)
Week of 04/20	Simple Linear Regression.	Ch. 14	
Week of 04/27	Multiple Regression.	Ch. 15	HW9
May, 5 (Tu) 10:15 AM – 12:15 PM	**Final Exam**		

Note: The schedule can be adjusted as needed except the exam dates. Any changes will be announced.