
FUNDAMENTALS OF DATA ANALYSIS

Grado en Comportamiento y Ciencias Sociales BBSS

SEP-2023 DIV-N-BBSS.1.M.A

Area Others

Number of sessions: 35

Academic year: 23-24

Degree course: FIRST

Number of credits: 6.0

Semester: 2º

Category: BASIC

Language: English

Professor: **ANTONIO LÓPEZ ROSELL**

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Antonio López is a sociologist specialized in the field of Business Design and Data Analysis. He holds a Bachelor in Sociology and a Master's Degree in Management and Research of Business Communication from the Universidad Rey Juan Carlos (Madrid, Spain), an MBA from the Lazarus project developed by the "Escuela de Organización Industrial" and the "Caja Rural" (Ciudad Real, Spain) and an Executive Master in Data Science and Machine Learning from KSchool (Madrid, Spain). His research interests include social sciences, machine learning and deep learning techniques and statistical computing in R and Python. He has worked as a researcher for the European Social Fund, has created the company Wibber (based on artificial intelligence systems for social media management) and currently works in his own Artificial Intelligence consultancy (Compai) in which they carry out training and implementation projects of digitization based on Artificial Intelligence systems for big companies. Also, he collaborates as a mentor or facilitator for innovative projects of companies and accelerators like The Coca Cola Company and Founder Institute.

Office Hours

Office hours will be on request. Please contact at:

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SUBJECT DESCRIPTION

Statistics is a discipline grounded in mathematics. We use mathematical tools to construct formal models and to transform raw data into useful information. Thus, allowing us to understand our surrounding world. Statistics summarizes and processes data. Inferential statistics provides accurate estimates as a way of enhancing the decision-making process by reducing uncertainty in a variety of environments: financial markets, insurance industry, biomedicine, consumer behavior, presidential elections, gambling industry, physics, etc.

In this course, students will learn how to make inferences using statistics, or functions of observed data.

This course will be the basis for further subjects as Probability and Statistics for Data Management and Analysis; forecasting and time-series, among others.

LEARNING OBJECTIVES

The objective of this course is to provide students with the tools to delve into data sets and to make use of this information in business, social and behavioral applications. At the end of the course, students should be able to:

- Perform statistical inference in one and two populations;
- Understanding key concepts related to hypothesis testing;
- Design experiments and run analysis of variance;
- Analyze categorical data;

Additionally, the course will focus on the acquisition or reinforcement of generic skills:

- The ability to think analytically;
- The use of statistical software and programming language, namely R;
- The ability to think critically.

TEACHING METHODOLOGY

The course consists of 35 sessions divided between theoretical (lecture-based) and practical (activity-based).

Lectures: The main resources in these classes will be projections of slides, providing files and electronic information and the use of the Internet as a support tool, work, and communication. The student must supplement these lectures with recommended readings by the professor. These will be made available to the students via Campus Online.

Practical: During these sessions, the students will work on exercises, case studies and practical cases specified well in advance; which are tightly connected with the theoretical concepts explained during the theoretical sessions. Most of the problems and projects will require computations, so students should be familiarized with software R-Studio. Students must prepare and solve the problem sets assigned prior to the beginning of the practice class by using the theory lectures and the recommended bibliography. Students are expected to participate actively in class, expressing their difficulties and proposing solutions. The professor will always help the students by clarifying the problem sets solutions; assuming the students have previously tried to work on their own. Otherwise, this will be counter-productive.

| Learning Activity | Weighting | Estimated time a student should dedicate to prepare for and participate in |
|-------------------|-----------|--|
| Lectures | 30.0 % | 45.0 hours |
| Discussions | 3.33 % | 5.0 hours |

| | | |
|---|---------|-------------|
| Exercises in class, Asynchronous sessions, Field Work | 20.0 % | 30.0 hours |
| Group work | 26.67 % | 40.0 hours |
| Individual studying | 20.0 % | 30.0 hours |
| TOTAL | 100.0 % | 150.0 hours |

PROGRAM

PROGRAM

The following program is tentative. Although we will attempt to cover all the listed topics, the pace of the class depends on group performance. All group projects/presentations must be submitted via Turnitin on Campus Online. No work will be accepted if submitted otherwise.

The content of the course is divided into five modules (See below). The sessions are a combination of theoretical and practical classes. All the required readings are from the compulsory textbook "Statistics for Business and Economics", MacClave, Benson & Sincich, 13th global edition. Reading a section means reading the text and doing the examples.

SESSION 1 (LIVE IN-PERSON)

MODULE 1: SAMPLING DISTRIBUTIONS AND CONFIDENCE INTERVALS (Sessions 1 to 7)

SESSION 1-2 [THEORY]: PRESENTATION & TOPIC 1

Topic 1: Sampling distributions

Presentation of the programme, aims and guidelines of the course. The Concept of a Sampling Distribution. Unbiasedness and Minimum Variance. The Sample Distribution of the Sample Mean and the Central Limit Theorem. The Sampling Distribution of the Sample Proportion

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 6.

SESSION 2 (LIVE IN-PERSON)

MODULE 1: SAMPLING DISTRIBUTIONS AND CONFIDENCE INTERVALS (Sessions 1 to 7)

SESSION 1-2 [THEORY]: PRESENTATION & TOPIC 1

Topic 1: Sampling distributions

Presentation of the programme, aims and guidelines of the course. The Concept of a Sampling Distribution. Unbiasedness and Minimum Variance. The Sample Distribution of the Sample Mean and the Central Limit Theorem. The Sampling Distribution of the Sample Proportion

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 6.

SESSION 3 (LIVE IN-PERSON)

SESSION 3 [LAB]: SAMPLING DISTRIBUTIONS WITH R

Sampling distributions with R: unif, binom, norm, chisq and f

SYNCHRONOUS

SESSION 4 (LIVE IN-PERSON)

SESSIONS 4-5 [THEORY]: TOPICS 1&2

Topic 1: Sampling Distributions

Topic 2: Inferences based on a single sample: Confidence Intervals

The Concept of a Sampling Distribution. Unbiasedness and Minimum Variance. The Sample Distribution of the Sample Mean and the Central Limit Theorem. The Sampling Distribution of the Sample Proportion. Identifying and Estimating the Target Parameter. Confidence Interval for a Population Mean: Normal (z) Statistic. Confidence Interval for a Population Mean: Student's t-Statistic. Large-Sample Confidence Interval for a Population Proportion. Determining the Sample Size. Finite Population Correction for Simple Random Sampling. Confidence Interval for a Population Variance

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 6 and 7.

SESSION 5 (LIVE IN-PERSON)

SESSIONS 4-5 [THEORY]: TOPICS 1&2

Topic 1: Sampling Distributions

Topic 2: Inferences based on a single sample: Confidence Intervals

The Concept of a Sampling Distribution. Unbiasedness and Minimum Variance. The Sample Distribution of the Sample Mean and the Central Limit Theorem. The Sampling Distribution of the Sample Proportion. Identifying and Estimating the Target Parameter. Confidence Interval for a Population Mean: Normal (z) Statistic. Confidence Interval for a Population Mean: Student's t-Statistic. Large-Sample Confidence Interval for a Population Proportion. Determining the Sample Size. Finite Population Correction for Simple Random Sampling. Confidence Interval for a Population Variance

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 6 and 7.

SESSION 6 (LIVE IN-PERSON)

SESSION 6 [LAB]: SAMPLING DISTRIBUTIONS AND CONFIDENCE INTERVALS

Problem Set 1 Solutions: Sampling Distributions and Confidence Intervals: Theory questions and problems to be solved with R.

SYNCHRONOUS Live classes / lectures

SESSION 7 (LIVE IN-PERSON)

SESSION 7 [THEORY]: REVIEW OF TOPICS 1&2

Topic 1: Sampling Distributions

Topic 2: Inferences based on a single sample: Confidence Intervals

The Concept of a Sampling Distribution. Unbiasedness and Minimum Variance. The Sample Distribution of the Sample Mean and the Central Limit Theorem. The Sampling Distribution of the Sample Proportion. Identifying and Estimating the Target Parameter. Confidence Interval for a Population Mean: Normal (z) Statistic. Confidence Interval for a Population Mean: Student's t-Statistic. Large-Sample Confidence Interval for a Population Proportion. Determining the Sample Size. Finite Population Correction for Simple Random Sampling. Confidence Interval for a Population Variance

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 6 and 7.

SESSION 8 (LIVE IN-PERSON)

SESSION 8-9 [THEORY]: TOPIC 3

Topic 3: Inferences based on a single sample: Test of hypothesis

The Elements of a Test of Hypothesis. Formulating Hypotheses and Setting Up the Rejection Region. Observed Significance Levels: p-Values. Test of Hypothesis about a Population Mean: Normal (z) Statistic. Test of Hypothesis about a Population Mean: Student's t-Statistic. Large-Sample Test of Hypothesis about a Population Proportion. Test of Hypothesis about a Population Variance. Power of the test.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 9

SESSION 9 (LIVE IN-PERSON)

SESSION 8-9 [THEORY]: TOPIC 3

Topic 3: Inferences based on a single sample: Test of hypothesis

The Elements of a Test of Hypothesis. Formulating Hypotheses and Setting Up the Rejection Region. Observed Significance Levels: p-Values. Test of Hypothesis about a Population Mean: Normal (z) Statistic. Test of Hypothesis about a Population Mean: Student's t-Statistic. Large-Sample Test of Hypothesis about a Population Proportion. Test of Hypothesis about a Population Variance. Power of the test.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 9

SESSION 10 (LIVE IN-PERSON)

SESSION 10 [LAB]: INFERENCE BASED ON ONE SAMPLE WITH R

Hypothesis testing with R: t-test, prop.test, varTest, var.test

SYNCHRONOUS

SESSION 11 (LIVE IN-PERSON)

SESSION 11 [THEORY]: TOPIC 3

Topic 3: Inferences based on a single sample: Test of hypothesis

The Elements of a Test of Hypothesis. Formulating Hypotheses and Setting Up the Rejection Region. Observed Significance Levels: p-Values. Test of Hypothesis about a Population Mean: Normal (z) Statistic. Test of Hypothesis about a Population Mean: Student's t-Statistic. Large-Sample Test of Hypothesis about a Population Proportion. Test of Hypothesis about a Population Variance. Power of the test. Identifying the Target Parameter.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: Readings: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 9

SESSION 12 (LIVE IN-PERSON)

SESSION 12: QUIZ 1 (COMPUTER EXAM USING R)

SYNCHRONOUS Live classes / lectures

The date of the quiz, like the rest of the sessions, is tentative and may vary depending on the pace of the class.

Sampling Distributions. Inferences based on a single sample: Estimation with Confidence Intervals. Inferences based on a single sample: Test of hypothesis.

SESSION 13 (LIVE IN-PERSON)

SESSION 13-14 [THEORY]: TOPIC 4

Topic 4: Inferences based on two samples

Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Comparing two population variances

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 8 and 10

SESSION 14 (LIVE IN-PERSON)

SESSION 13-14 [THEORY]: TOPIC 4

Topic 4: Inferences based on two samples

Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Comparing two population variances

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 8 and 10

SESSION 15 (LIVE IN-PERSON)

SESSION 15 [LAB]: INFERENCE BASED ON TWO SAMPLES WITH R

Problem Set 2 Solutions: Inferences based on one and two samples: Theory questions and problems to be solved with R: t-test, prop.test, varTest, var.test

SYNCHRONOUS Live classes / lectures

SESSION 16 (LIVE IN-PERSON)

SESSION 16 [THEORY]: REVIEW OF TOPICS 3 & 4

Topic 3: Inferences based on a single sample: Test of hypothesis

Topic 4: Inferences based on two samples

The Elements of a Test of Hypothesis. Formulating Hypotheses and Setting Up the Rejection Region. Observed Significance Levels: p-Values. Test of Hypothesis about a Population Mean: Normal (z) Statistic. Test of Hypothesis about a Population Mean: Student's t-Statistic. Large-Sample Test of Hypothesis about a Population Proportion. Test of Hypothesis about a Population Variance. Power of the test. Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Comparing two population variances

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 8 and 10

SESSION 17 (LIVE IN-PERSON)

MODULE 3: ANALYSIS OF VARIANCE (Sessions 17 to 24)

SESSION 17-18 [THEORY]: TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 18 (LIVE IN-PERSON)

MODULE 3: ANALYSIS OF VARIANCE (Sessions 17 to 24)

SESSION 17-18 [THEORY]: TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 19 (LIVE IN-PERSON)

SESSION 19 [LAB]: ANALYSIS OF VARIANCE WITH R

Analysis of Variance with R: aov

SYNCHRONOUS

SESSION 20 (LIVE IN-PERSON)

SESSION 20 [LAB]: ANALYSIS OF VARIANCE WITH R

Analysis of Variance with R: aov

SYNCHRONOUS

SESSION 21 (LIVE IN-PERSON)

SESSIONS 21-22 [THEORY]: TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 22 (LIVE IN-PERSON)

SESSIONS 21-22 [THEORY]: TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 23 (LIVE IN-PERSON)

SESSION 23 [LAB]: ANALYSIS OF VARIANCE

Problem Set 3 Solutions: Analysis of Variance: Theory questions and problems to be solved with R: aov

SYNCHRONOUS Live classes / lectures

SESSION 24 (LIVE IN-PERSON)

SESSION 24-25 [THEORY]: REVIEW OF TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 25 (LIVE IN-PERSON)

SESSION 24-25 [THEORY]: REVIEW OF TOPIC 5

Topic 5: Analysis of Variance

Identifying the Target Parameter. Comparing Two Population Means: Independent Sampling. Comparing Two Population Means: Paired Difference Experiments. Comparing Two Population Proportions: Independent Sampling. Determining the Required Sample Size. Elements of a Designed Experiment. The Completely Randomized Design: Single Factor. Multiple Comparisons of Means. The Randomized Block Design. Factorial Experiments: Two Factors

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 15

SESSION 26 (LIVE IN-PERSON)

MODULE 4: CATEGORICAL DATA ANALYSIS (Sessions 26 to 29)

SESSION 26-27 [THEORY]: TOPIC 6

Topic 6: Categorical Data Analysis

Categorical data and the multinomial experiment. Testing category probabilities: One-way table. Testing categorical probabilities: Two-way (Contingency) table.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 14.1-14.3

SESSION 27 (LIVE IN-PERSON)

MODULE 4: CATEGORICAL DATA ANALYSIS (Sessions 26 to 29)

SESSION 26-27 [THEORY]: TOPIC 6

Topic 6: Categorical Data Analysis

Categorical data and the multinomial experiment. Testing category probabilities: One-way table. Testing categorical probabilities: Two-way (Contingency) table.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. &

Thorne, Betty. Chapter 14.1-14.3

SESSION 28 (LIVE IN-PERSON)

SESSION 28: QUIZ 2 (EXAM USING R)

SYNCHRONOUS Live classes / lectures

The date of the quiz, like the rest of the sessions, is tentative and may vary depending on the pace of the class.

Inferences based on two samples. Analysis of variance.

SESSION 29 (LIVE IN-PERSON)

SESSION 29 [LAB]: CATEGORICAL DATA ANALYSIS WITH R

Categorical data analysis with R: VCD package, `.table()`, `prop.table()`, `chisq.test()`.

SYNCHRONOUS

SESSION 30 (LIVE IN-PERSON)

SESSION 30 [LAB]: CATEGORICAL DATA ANALYSIS WITH R

Problem Set 4 Solutions: Categorical Data Analysis: Theory questions and problems to be solved with R: `prop.table()`, `chisq.test()`

SYNCHRONOUS Live classes / lectures

SESSION 31 (LIVE IN-PERSON)

MODULE 5: NON PARAMETRIC TESTS (Sessions 31 to 34)

SESSION 31-32 [THEORY]: TOPIC 7

Topic 7: Non-parametric tests

Introduction. Tests based on one sample. Tests based on two samples. Tests based on more than two samples. Chi-square tests for Poisson distribution.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 14.4-14.7

SESSION 32 (LIVE IN-PERSON)

MODULE 5: NON PARAMETRIC TESTS (Sessions 31 to 34)

SESSION 31-32 [THEORY]: TOPIC 7

Topic 7: Non-parametric tests

Introduction. Tests based on one sample. Tests based on two samples. Tests based on more than two samples. Chi-square tests for Poisson distribution.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 14.4-14.7

SESSION 33 (LIVE IN-PERSON)

SESSION 33 [LAB]: NON-PARAMETRIC TESTS WITH R

Non parametric tests with R: SignTest(), wilcox.test(), friedman.test(), kruskal.test(), chisq.test(),. Interpretation.

SYNCHRONOUS

SESSION 34 (LIVE IN-PERSON)

SESSION 34 [THEORY]: REVIEW OF TOPIC 7

Topic 7: Non-parametric tests

Introduction. Tests based on one sample. Tests based on two samples. Tests based on more than two samples. Chi-square tests for Poisson distribution.

SYNCHRONOUS Live classes / lectures

Readings:

Book Chapters: "Statistics for Business and Economics", Newbold, Paul, Carlson, William L. & Thorne, Betty. Chapter 14.4-14.7

SESSION 35 (LIVE IN-PERSON)

SESSION 35: FINAL THEORY EXAM (BLACKBOARD ULTRA)

Final individual exam with theory questions. Questions submitted through BlackBoard.

The final exam encompasses all the topics covered during the course

SYNCHRONOUS Live classes / lectures

EVALUATION CRITERIA

Class participation (10%)

Two main criteria will be used in reaching a judgment about your class participation:

1. **Active participation:** participation in class will be evaluated positively if students: (1) attain a threshold quantity of contributions that is sufficient for making a reliable assessment of comment quality. Additionally, (2) participation will be evaluated in quality terms. A high-quality comment reveals a depth of insight, rigorous use of case evidence, consistency of argument, and realism. A high-quality presentation of ideas must consider the relevance and timing of comments and the flow and content of the ensuing class discussion. It demands comments that are concise and clear, and that are conveyed with a spirit of involvement in the discussion at hand.
2. **Exercises to practice:** Students may solve exercises proposed by the Professor. Grades will be based on the performance of these exercises and the time devoted to their resolution. It is highly recommended that you solve these exercises by hand and using R. Quizzes will have exercises similar to these ones.

Group project (25%) (see separate document)

The elements for effective teamwork can help you to achieve success in all areas of life. It is crucial that you learn how to collaborate with other students even when you have not chosen the students whom to work with. Each group will be composed of four students and must prepare a project due at the end of the course (more details about the final deadline will be periodically provided during the course). The group project will consist in the identification of a real-world problem, taken from social sciences or any other field of interest, the collection of relevant data, the statistical analysis of the data, the development of a statistical model, and the final interpretation of the obtained results. Submissions will be delivered using Turnitin, following the appropriate link provided on campus online. No work will be accepted if submitted otherwise. At the beginning of the course, the professor will upload a specific document called project instructions where a step-by-step description of what the students need to do.

Quizzes (20%)

There will be two quizzes during the semester. These quizzes will be taken individually and they are intended to evaluate students' understanding of the material and the use of R-studio. Questions will be similar to the exercises to practice proposed by the Professor.

Labs (Problem Sets) (15%)

Students will solve 4 problem sets throughout the course, one problem set per module, but the last one. Answers will be submitted through BlackBoard tests.

Final Exam (30%)

It will be taken in session 35 and will cover all the content of the course. The final exam will include material from the PowerPoint slides and the problem sets. It is highly recommendable to delve deeply into the topics using the book. For the theory exam, students must bring their own simple calculator (neither programmable nor graphical calculators are allowed. Phones, tablets, laptops, and other electronic devices are not allowed). Students are also allowed to bring up two-sided A4 SHEET paper with any formulae considered helpful. Students must bring the Stat-tables, available on campus online. No questions are allowed during the exams.

In order to pass the course, you need a minimum grade of 3.5 in the final exam. If your grade in the final exam does not reach the threshold value of 3.5, you will fail the course, even in the case in which your weighted average (computed using the table above) exceeds 5.0.

Your final grade of the course will be based on a combination of different criteria that are described in the following table.

| criteria | percentage | Learning Objectives | Comments |
|---------------------|-------------------|----------------------------|-----------------|
| Final Exam | 30 % | | |
| Labs (Problem sets) | 15 % | | |
| Group Project | 25 % | | |
| Quizzes | 20 % | | |
| Class Participation | 10 % | | |

RE-SIT / RE-TAKE POLICY

Retake exam

Each student has four chances to pass any given course distributed in two consecutive academic years (regular period and July period). It is mandatory to attend 100% of the classes. Students who do not comply with at least 80% attendance will lose their 1st and 2nd chance, and go directly to the 3rd one (they will need to enroll again in this course the next academic year). Grading for retakes will be subject to the following rules:

1. Those students who failed the subject in the first regular period will have to do a retake in July (except those not complying with attendance rules who are banned from this possibility).
2. Dates and location of the July retakes will be posted in advance and will not be changed.

Please take this into consideration when planning your summer.

3. The maximum grade that a student may obtain in the 2nd exam session (retake) is 8 out of 10. Those students in the 3rd call will be required to attend 50% of the classes. If due to schedule overlap, a different option will be discussed with the professor in order to pass the subject.

BIBLIOGRAPHY

Compulsory

- Newbold, Paul, Carlson, William L. & Thorne, Betty.. (2013). *"Statistics for Business and Economics"*. 8th. Pearson Prentice Hall. ISBN 9780273767060 (Digital)

Recommended

- McClave J.T, Benson P.G. & Sincich T. (2018). *Statistics for Business and Economics*. 13th edition. Pearson Prentice Hall. ISBN 9781292227 (Digital)

- Díez, David; Barr Christopher & Cetinkaya-Rundel. (2019). *Open Intro Statistics*. 4th edition. Mine. ISBN 1943450072 (Digital)

<https://www.openintro.org/>

BEHAVIOR RULES

Please, check the University's Code of Conduct [here](#). The Program Director may provide further indications.

ATTENDANCE POLICY

Please, check the University's Attendance Policy [here](#). The Program Director may provide further indications.

For In-Person programs, students should attend their live in-person sessions on campus.

Attendance at all scheduled classes is mandatory and essential for success in the course. In order to pass the course the student must attend, at least, 80% of the sessions. Students attending less than 80% of sessions will be graded with a FAIL for the course. This fail will apply to the ordinary and extraordinary calls of the current academic year.

If you miss class for any reason, you are responsible for getting notes from classmates. If you have questions about any assignment please send me an email. Under most circumstances, students who miss a class in which a presentation, mid-term, or final exam is held will not be granted an exception or given an opportunity to do a make-up assignment or exam. However, if illness or other circumstances prevent you from adhering to the assignment/presentation due dates stated in this syllabus, contact your academic director to ask for an exception.

Students with Special Needs:

To request academic accommodations due to a disability, please contact Robert Polding via email at: robert.polding@ie.edu

ETHICAL POLICY

Please, check the University's Ethics Code [here](#). The Program Director may provide further indications.

Student Privacy Statement:

At times, students may disclose personal information through class discussions. It is expected that all members of the class will respect the privacy of their classmates. This means that the information disclosed in the class will not be repeated or discussed with other students outside of the course.

Decisions about Grades:

Decisions about grades are made very carefully, and are final at the end of the course. If you have questions regarding a certain grade or you would like to receive personal feedback, you must request a meeting with me to discuss grades on specific assignments before the last class of the course. Any disputes regarding grades must be resolved before the final exam. "Extra credit" or makeup assignments will only be allowed under extenuating circumstances at the sole discretion of the course professor.

ACADEMIC INTEGRITY

Unless you are specifically instructed to work with other students in a group, all of your assignments, papers, projects, presentations, and any work I assign must reflect your own work and thinking.

What is academic integrity? When you do the right thing even though no one is watching. The core values of integrity, both academic and otherwise include: honesty, fairness, respect, responsibility, and trust. Academic Integrity requires that all students within Instituto de Empresa (IE) act in accordance with these values in the conduct of their academic work, and that they follow the rules and regulations concerning the accepted conduct, practices and procedures of academic research and writing. Academic Integrity violations are defined as Cheating, Plagiarism or other violations of academic ethics.

Cheating and plagiarism are very serious offenses governed by the IE student code of conduct. Any student found cheating or plagiarizing on any assignment or component of this course will at a minimum receive a "0" on the affected assignment. Moreover, the student will also be referred to the University Judicial System for further action. Additional penalties could include a note on your transcript, failing the class, or expulsion from the university.

It is important to note that, while the list below is comprehensive, it should not be considered exhaustive.

Cheating includes:

1. An act or attempt to give, receive, share, or utilize unauthorized information or unauthorized assistance at any time for assignments, papers, projects, presentations, tests or examinations.
2. Students are permitted to mentor and/or assist other students with assignments by providing insight and/or advice. However, students must not allow other students to copy their work, nor will students be permitted to copy the work of other students. Students must acknowledge when they have received assistance from others.
3. Failure to follow rules on assignments, papers, projects, presentations, tests or examinations as provided by the course professor and/or as stipulated by IE.
4. Unauthorized co-operation or collaboration.
5. Tampering with official documents, including electronic records.
6. The impersonation of a student on presentations, exercises, tests or an examination. This

includes logging onto any electronic course management tool or program (e.g. Black Board, etc.) using someone else's login and password.

Plagiarism includes:

1. Using the work of others and attempting to present it as your own. For example, using phrases or passages from books, articles, newspapers, or the internet and not referencing them properly in your document. This includes using information from others without citing it, misrepresentation of cited work, and misuse of quotation marks.
2. Submitting an assignment or paper that is highly similar to what someone else has written (i.e., minimal changes in wording, or where the sentences are similar, but in a different order).
3. You don't have to commit "word for word" copying to plagiarize – you can also plagiarize if you turn in something that is "thought for thought" the same as someone else.

Other violations of academic ethics include:

1. Not acknowledging that your work or any part thereof has been submitted for credit elsewhere.
2. Misleading or false statements regarding work completed.
3. Knowingly aiding or abetting anyone in committing any form of an Academic Integrity violation.

