Big Data for Marketing
Guía docente 2023-24

INTRODUCTION

Course description:

The understanding and analysis of large amounts of data (big data) for marketing decision-making is increasingly important for marketing professionals. This course deals with the conceptual, methodological and application aspects of Big Data and Machine Learning to solve marketing problems from a theoretical and practical perspective, focusing on the applications of data science to areas such as customer management, pricing decisions, recommendation systems or the analysis of consumer behaviour.

- **Degree:** Marketing
- **Module in the Degree Program**: Module VII. Optional Courses
- **Number of credits:** 3 ECTS
- **Year:** Third and Fourth Year, 2° semester
- **Type of course:** Optional
- **Instructors**: Dr. D. Ángel Arrese and Dra. Dª Clara González Tosat
- **Language:** Spanish and English
- **Department:** Marketing and Media Management, School of Communication
- **Lecture schedule:** Monday, 17:30 to 19:15 (Aula 12)

COMPETENCIES

GENERAL COMPETENCIES

GC1 - Understand and critically evaluate the shaping elements of the human being and current society in its multiple dimensions: anthropological, historical, cultural, social and economic, which influence the business and marketing context.

GC2 - Knowing and assessing the role of marketing from a multidimensional perspective: historical, economic and business, legal, sociological, deontological and technological.

GC3 - Knowing the tools and techniques of innovation and entrepreneurship processes that occur in marketing management.

GC4 - Apply marketing tools based on an in-depth analysis and understanding of the functioning of markets and consumer behaviour.

GC5 - Apply leadership, teamwork, planning and time management skills to responsible decision-making and problem-solving in marketing.

CORE COMPETENCIES

CB1 - Students have demonstrated knowledge and understanding in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2 - Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences typically demonstrated through the development and defence of arguments and problem solving within their field of study.

CB3 - Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements that include reflection on relevant social, scientific or ethical issues.

CB4 - Students are able to convey information, ideas, problems and solutions to both specialist and non-specialist audiences.

SPECIFIC COMPETENCIES

CE14 - Apply analytical, strategic and creative thinking to the solution of marketing and commercialisation problems.

CE15 - Knowing the basic mathematical and statistical concepts and their use to analyse business and marketing situations using data processing software.

CEO5 - Know advanced statistical and mathematical tools for the treatment of marketing information and data in order to improve decision-making processes.

PROGRAM

I. INTRODUCTION

1. THE BIG DATA ECOSYSTEM
2. BIG DATA AND DATA SCIENCE: STATISTICS/MATHEMATICS, NETWORKS /PROGRAMMING, AND BUSINESS

II. THE DATA MINDSET

1. THE NUMERICAL MINDSET AND COMPUTATIONAL THINKING: ALGORITHMS
2. HYPOTHESIS TESTING, CONFUSION MATRICES AND ROC CURVES

III. MACHINE LEARNING

1. MACHINE LEARNING: SUPERVISED MODELS
2. MACHINE LEARNING: UNSUPERVISED MODELS

IV. BIG DATA AND MARKETING

1. APPLIED BIG DATA: MARKET BASKETS AND ASSOCIATION RULES
2. APPLIED BIG DATA: CHURN PREDICTION
3. APPLIED BIG DATA: PRICE OPTIMIZATION
4. APPLIED BIG DATA: SENTIMENT ANALYSIS
5. APPLIED BIG DATA: RECOMMENDATION SYSTEMS
6. APPLIED BIG DATA: SEGMENTATION
7. BIG DATA AND ETHICS

EDUCATIONAL ACTIVITIES

The course combines theoretical and practical training by reviewing the theoretical contents on the lectures and carrying out exercises on each of the parts of the programme. During the classes, in addition to the resolution and explanation of these exercises, comprehension tests of the contents of the course will be carried out. The course will include both individual and group work/exercises.

The training activities required of students are as follows:

Follow-up of lectures (theory and practical sessions). Regular class attendance is essential in order to learn, since otherwise it is practically impossible to keep up with the pace of the course, both in terms of its theoretical development and the different activities required in the classes. Given the way the subject is taught (without printed notes, with participation in the classes, etc.) it is essential to have personal notes, which should also be regularly compared with those of other students. (30 classroom hours).

Study. During the course, the student carries out comprehension tests of the theoretical contents of the subject's presentations (10 hours of study and 1 hour of tests).

Exercises. In line with the topics developed in class, students will be asked to carry out exercises (individual and group) (20 hours of work).

The study for the final exam must be oriented to the understanding of the subject as a whole, and the exam questions will focus both on the theoretical contents of the lectures and the practical aspects worked on in the exercises (15 hours of study, and 2 hours of exams).

ASSESSMENT

ORDINARY

The grade for the course is made up of the **final exam (60% of the mark)** and the personal mark for the activities and exercises carried out inside and outside the classroom, **both individually and in groups (30%)**, as well as the **tests carried out in the classroom (10%)**.

EXTRAORDINARY

The student must pass an exam covering **all the theoretical and practical content of the course** in a global evaluation (**100%**).

IMPORTANT: any attempt of fraud, cheating, copying, plagiarism or other irregular behaviour by students in any of the activities (exams, cases, class tests, etc.) will be sanctioned with the failure of the course.

OFFICE HOURS

Dr. Ángel Arrese (aarrese@unav.es)

- Desk 0750. Ismael Sánchez-Bella Library Building. First Floor, Department of Marketing and Media Management
- Office hours: Monday, 16:00 to 18:00, and Tuesday, 12:00 to 14:00.

BIBLIOGRAFÍA

![Universidad de Navarra logo]

This list of books is a complete reference bibliography on the topics covered in the course, which may be of help to those who in the future would like to further explore these topics. The works highlighted in red can serve as first readings in each of the sub-themes.

Statistics and Statistical Thinking

Abelson, Robert P. *Statistics as Principled Argument*. Psychology Press. 1995.

Best, Joel. *Damned Lies and Statistics: Untangling Numbers from the Media, Politicians, and Activists*. University of California Press. 2001.

Bram, Uri. *Thinking Statistically*. EPub. 2011.

Field, Andy. *An Adventure in Statistics*. Sage. 2016.

Freedman, David, Pisani, Robert, & Purves, Roger. *Statistics*. 4ª Ed. Norton & Company. 2007.

Freedman, David. *Statistical Models: Theory and Practice*. Cambridge University Press. 2009.

Fung, Kaiser. *Numbers Rule Your World: The Hidden Influence of Probabilities and Statistics on Everything You Do*. McGraw-Hill. 2010.

Gonik, Larry, & Smith, Woollcott. *The Cartoon Guide to Statistics*. Collins, 1993.

Gutman, Alex J., & Goldmeier, Jordan. *Becoming a Data Head. How to Think, and Understand Data Science, Statistics, and Machine Learning*. Wiley. 2021.

Hand, David J. *Statistics: A Very Short Introduction*. Oxford University Press. 2008.

Harford, T. *How to Make the World Add Up. Ten Rules for Thinking Differently About Numbers*. The Bridge Street Press. 2020. [Localízalo en la Biblioteca](#)

Hastie, Trevor, Tibshirani, Robert, & Friedman, Jerome. *The Elements of Statistical Learning. Data Mining, Inference and Prediction*. 2º Ed. Springer. 2017.

Huff, Darrell. *How to Lie with Statistics*. Norton & Co. 1953.

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Kahneman, Daniel, Sibony, Oliver, & Sustein, Cass R. *Noise: A Flaw in Human Judgment*. Little, Brown, & Company. 2021.

Mlodinow, Leonard. *The Drunkard's Walk. How Randomness Rules Our Lives*. Pantheon. 2009.

Reinhart, Alex. *Statistics Done Wrong: The Woefully Complete Guide*. No Starch Press. 2015.

Salsburg, David. The Lady *Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century*. Freeman. 2001.

Silver, Nate. *The Signal and the Noise: Why Most Predictions Fail but Some Don't*. Penguin. 2012.

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Stigler, Stephen M. *The Seven Pillars of Statistical Wisdom*. Harvard University Press. 2016.

Theobald, Oliver. *Statistics For Absolute Beginners*. 2º Ed. Scatterplot Press. 2017.

Wasserman, Larry. *All of Statistics*. Springer. 2003.

Wheelan, Charles. *Naked Statistics: Stripping the Dread from the Data*. Norton & Co. 2013.

Witte, Robert S., & Witte, John S. *Statistics*. 11ª Ed. Wiley. 2017.

Big Data

Bahga, Arshdeep & Madisetti, Vijay. *Big Data Science & Analytics. A Hands-On Approach*. Hands On Book Series. 2019.

EMC Education Services. *Data Science & Big Data Analytics*. Wiley. 2015.

Ghavami, Peter. *Big Data Analytics Methods. Analytics Techniques in Data Mining, Deep Learning, and Natural Language Processing*. 2º Ed. De Gruyter. 2020.

Grus, Joel. *Data Science from Scratch. First Principles with Python*. O'Reilly. 2019.

Holmes, Dawn E. *Big Data. A Very Short History*. Oxford University Press. 2017.

Hurwitz, Judith, Nugent, Alan, Halper, Fern, & Kaufman, Marcia. *Big Data for Fummies*. Wiley. 2013.

Kunigk, Jan, Buss, Ian, Wilkinson, Paul & George, Lars. *Architecting Modern Data Platforms*. O'Reilly. 2019.

Zgurovsky, Michael & Zaychenko, Y. *Big Data: Conceptual Analysis and Applications*. Studies in Big Data, 58. Springer. 2020.

Data Analytics & Data Science

Ahmed, Mohiuddin, & Pathan, Al-Sakib Khan. *Data Analytics. Concepts, Tehniques, and Applications*. CRC Press. 2019.

Blum, Avrim, Hopcroft, John, & Kannan, Ravindran. *Foundations of Data Science*. Cambridge University Press. 2020.

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Deokar, Amit, Gupta, Ashish, Iyer, Lakshmi, & Jones, Mary (eds.). *Analytics and Data Science*. Springer. 2018.

Forema, John W. *Data Smart. Using Data Science to Transform Information Into Insight*. Wiley. 2014. [Localízalo en la Biblioteca](#)

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Medes, Joao, De Carvalho, André, & Horvath, Tomas. *A General Introduction to Data Analytics*. Wiley. 2019.

Ott, R. Lyman, & Longnecker, Michael. *An Introduction to Statistical Methods and Data Analysis*. 7ª Ed. Cengage. 2016.

Peng, Roger D., & Matsui, Elizabeth. *The Art of Data Science*. Leanpub. 2015.

Shah, Chirag, *A Hands-On Introduction to Data Science*. Cambridge University Press. 2020.
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Tan, Pang-Ning, Steinbach. Michael, Kaepatne, Anuj, & Kumar, Vipin. *Introduction to Data Mining*. Pearson. 2019.

Zamora, Alfonso, Quesada, Carlos, Hurtado, Lluis, & Mondéjar, Diego. *An Introduction to Data Analysis in R*. Springer. 2020.

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Machine Learning

Abu-Mostafa, Yaser, Magdon-Ismail, Malik, & Lin, Hsuan-Tien. *Learning from Data. A Short Course*. AML Books. 2012.

Agrawal, A., Gans, J., and Goldfarb, A. *Prediction Machines: The Simple Economics of Artificial Intelligence*. Harvard Business Review Press,. 2022

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Burkov, Andriy. *The Hundred-Page Machine Learning Book*. 2019.

Christian, Brian, & Griffiths, Tom. *Algorithms to Live By*. Collins. 2016.

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Applications of Big Data & Data Science (Business & Marketing)

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