About Zaragoza Logistics Center (ZLC)

Zaragoza Logistics Center (ZLC) is a research institute established by the Government of Aragon in Spain in partnership with the Massachusetts Institute of Technology and the University of Zaragoza. ZLC mission is to create an international center of excellence for research and education in logistics and SCM that actively engages with industry and the public sector to develop and disseminate knowledge.

A core purpose of ZLC is to integrate supply chain management into business. The research program is aligned to Zaragoza Logistics Center’s (ZLC) mission of focusing on enhancing economic growth and competitiveness through innovation. ZLC serves as an exclusive model for closer cooperation between industry, public administration and academia in funding research and using the knowledge transfer accumulated to rapidly reap commercial rewards.

The members of ZLC research group carry out top level research in the following areas: Supply Chain Security and Risk Management, Inventory Management, Behavioural Supply Chain Management, Transport and Urban Mobility, Logistics Clusters, Supply Chain and Finance, Global Health and Humanitarian Logistics and Green Supply Chains.

www.zlc.edu.es

About MIT Zaragoza PhD Program in Logistics and Supply Chain Management

The main aim of the PhD Program in Logistics and Supply Chain Management is to develop outstanding scholars who will go on to pursue distinguished careers in research and education. As a unique focused PhD Program on Supply Chain Management students work intensively with our faculty to create new knowledge in fields of interest such as supply chain coordination, inventory management, supply chain finance, supply chain risk management and security, and supply chain innovation, among others. As part of their methodological and research training, PhD students spend one or two semesters at MIT. For more information: www.zlc.edu.es/education/mit-zaragoza-phd/
**Statistics and Probability Models**

**DESCRIPTION**

The objective of this course is to provide a review/introduction of basic probability and statistical models and tools. We will also provide students with basic tools from statistics, including sampling theory, hypothesis testing, regression, cluster analysis, time series, among others.

This course also introduces various topics in stochastic processes, such as Poisson processes, renewal theory, discrete and continuous-time Markov chains. Mathematical theories are illustrated by examples and applications mainly from manufacturing, operations and supply chain management. Case studies will be used in class in order to illustrate the application of these tools.

**LEARNING OBJECTIVES**

A student who has met the objectives of the course is expected to be familiar with the basic concepts of the theory of statistics and stochastic processes in discrete and continuous time and to be able to use various analytical and computational techniques to study stochastic and statistics models that appear in applications. The students will be able to make inferences and transform raw data into intelligence, providing with a more realistic understanding of its application to actual supply chain management in practice.

**COURSE OUTLINE**

The course is divided in two main components:

**A. Statistics Models**

Topic A1: Introduction, Background, Descriptive Statistics.

Topic A2: Sampling Distributions, Point Estimation, Statistical and Confidence Intervals, Hypotheses testing.

Topic A3: Factor analysis. Applications and cases.

Topic A4: Analysis of Variance, Multiple Regression Analysis. Applications in SPSS and cases.

Topic A5: Cluster Analysis. Applications in SPSS and cases.


**B. Probability and Stochastic Models**

Topic B1: Preliminaries. Review the basic ideas of probability theory, random variables, expected value, moment generating functions, conditional expectation


Topic B5: Continuous-time Markov Chains. Birth and death processes, the transition probabilities, limiting probabilities, uniformization, applications.
Course Information

**Statistics Models**

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<tr>
<th>DATES</th>
<th>TIME</th>
<th>INSTRUCTOR</th>
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<tbody>
<tr>
<td>October 14th, 16th, 21st, 23rd, 28th, 30th</td>
<td>11.00-12.30</td>
<td>María Jesús Sáenz</td>
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<tr>
<td>November 4th, 6th, 11th, 13th, 18th, 25th</td>
<td>11.00-12.30</td>
<td>María Jesús Sáenz</td>
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**Probability and Stochastic Models**

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<tr>
<td>November 7th, 14th, 17th</td>
<td>10.00-13.00</td>
<td>Jianjun Xu</td>
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<tr>
<td>November 11th, 20th</td>
<td>14.00-17.00</td>
<td>Jianjun Xu</td>
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*Schedules are subject to change*

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**Faculty**

**María Jesús Sáenz**

María Jesús Sáenz is currently the ZLC Deputy Director, PhD Program Director and Professor at the MIT-Zaragoza International Logistics Program at Zaragoza Logistics Center, where she teaches different courses on Supply Chain Management, Warehousing Logistics and Project Management. She is also the Director of the Behavioral SCM research group and a Research Associate at the MIT Center for Transportation and Logistics. She is Associate Professor in the School of Engineering at the University of Zaragoza, where she teaches Project Management and Logistics. Previously, she was the Academic Director of the Zaragoza Logistics Center and the Director of the Spanish National Center of Excellence in Logistics.

**Jianjun Xu**

Jianjun Xu is an Assistant Professor at the Zaragoza Logistics Center. He received his BSc degree in Computational Mathematics from Shandong University, China, and his PhD in Operations Management from Nanyang Business School of the Nanyang Technological University, Singapore. From 2009 to 2010 he was research fellow at the Memorial University of Newfoundland. Dr. Xu’s main research interests are in inventory management, green supply chain management with carbon reduction, assortment production design and manufacturing.
General Information

**APPLICATION DEADLINE**

**WHO SHOULD APPLY**

PhD students in different areas of Management such as Economics, Operations Management, Supply Management, Logistics, Transportation, etc.

**HOW TO APPLY**

All candidates must apply directly to the Admissions Office. Applications should be emailed to phdadmissions@zlc.edu.es; Please write “Application PhD Course Statistics and Probability Models” as the subject of your email.

Below is a list of the supplemental documents needed to complete your application.

1. Specify your area of research interest and/or PhD Project, and your status of your PhD program.
2. Resumé.
   Submit a current resumé, including academic degree information with GPA information following each degree, as well as relevant work experience.

**Venue**

Zaragoza Logistics Center
Edificio Náyade 5
C/ Bari 55 (PLAZA)
50197 Zaragoza, Spain

**Registration Fee**

700€
Discounts are available for multiple attendees from the same University or Institution.

This fee includes tuition and materials. Accommodation must be arranged by the participants individually and is not included in the course fee.

The program is taught entirely in English.

The course is equivalent of 4 ECTS points. A course certificate is issued by the Zaragoza Logistics Center (ZLC) as a part of the MIT Global SCALE Network.

**Deadline for applications: October 2nd 2014**

**More Information**

For any further questions, please contact the Admissions Office:

**Pilar Aldea**
phdadmissions@zlc.edu.es
+34 976 077 631