

Statistics

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Basic	Statistics	1	2º	6	Basic
LECTURER(S)			Postal address, telephone nº, e-mail address		
<ul style="list-style-type: none"> Dr. Francisco A. Ocaña Lara 			Dept. Statistics and Operations Research, 1st floor, Faculty of Pharmacy URL: http://www.ugr.es/local/focana/ E-mail: focana@ugr.es		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Degree in Food Science and Technology					
PREREQUISITES and/or RECOMMENDATIONS (if necessary)					
Some basic subjects of Mathematics: elemental concepts, derivatives and integrals of real-valued functions, elemental functions.					
BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE ;??)					
<ul style="list-style-type: none"> Descriptive Statistics. Description of statistical variable. Statistical regression models. Contingency tables. Probability and Inference. Sampling. Statistical Quality Control. 					
GENERAL AND PARTICULAR ABILITIES					
General abilities: <ul style="list-style-type: none"> CG1: Express oneself correctly in the Spanish language in their disciplinary field. CG2: Problem resolution. CG3: Teamwork. CG4: Apply theoretical knowledge to practice. CG6: Ethical commitment. CG8: Critical reasoning. CG10: Organizational skills and planning. 					



- CG11: Information management.

Specific ability:

CE1: Recognize and apply the physical, chemical, biochemical, biological, physiological, mathematical and statistical fundamentals necessary for understanding and development of Food Science and Technology.

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

- Know statistical descriptive methods, statistical measures and regression techniques.
- Know the fundamentals of probability, random variables and notable probability distributions.
- Know the most frequent sampling procedures.
- Know the principles of statistical inference and its application to problems related to Food Science and Technology.
- Interpret control charts and their application in production processes.

DETAILED SUBJECT SYLLABUS

1. Descriptive analysis of statistical data.

1.1. Introduction. Basic concepts.

1.2. Statistical variable: types, tables, plots.

1.3. Statistical measures.

1.4. Bidimensional statistical variables: tables, covariance, linear correlation coefficient.

Exercises and applications.

2. Statistical regression models.

2.1. Concept of statistical regression.

2.2. Least squares regression.

2.3. Linear regression: linear equation, residual variance.

2.4. Non-linear regression: polynomials, exponential, etc.

Exercises and applications.

3. Probability.

3.1. Basic concepts. Algebra of events.

3.2. Space of probability. Probability axioms.

3.3. Conditional probability. Independence.

3.4. Total probability and Bayes Theorems.

3.5. Diagnostic tests: an application.

Exercises and applications.

4. Random variables.

4.1. Introduction.

4.2. Types of random variables.

4.3. Characteristics of a random variable.

Exercises and applications.

5. Some probability models for random variables.

5.1. Probability distributions of discrete random variables.

5.2. Probability distributions of continuous random variables.

Exercises and applications.



6. Statistical Inference.
6.1. Introduction. Basic concepts.
6.2. Sampling.
6.3. Estimation procedures. Pointwise estimation.
6.4. Properties of some estimators. Central Limit Theorem.
Exercises and applications.

7. Confidence intervals.
7.1. Introduction.
7.2. Confidence intervals for the Normal distribution.
7.3. Confidence interval for the Poisson distribution.
7.4. Confidence interval for a proportion.
Exercises and applications.

8. Hypothesis testing.
8.1. Introduction. Basic concepts.
8.2. Hypothesis tests for the Normal model.
8.3. Hypothesis tests for the Poisson model.
8.4. Hypothesis tests for a proportions.
8.5. Chi-square hypothesis tests.
8.5.1. Goodness of fit.
8.5.2. Homogeneity.
8.5.3. Independence
Exercises and applications.

9. Statistical quality control.
9.1. Targets of the quality control. The quality control production processes.
9.2. Variability.
9.3. Control of Online production processes: tolerance intervals and control charts.
9.4. Reception control.
9.5. Sampling planes. Acceptance-rejection plans.

READING

FUNDAMENTAL BIBLIOGRAPHY:

- Aguilera, A.M. (2000) *Curso y Ejercicios de Cálculo de Probabilidades*. Granada: La autora.
- Alonso, F.J., García, P.A., and Ollero, J.E. (1996) *Estadística para Ingenieros*. Madrid: Colegio de Ingenieros de Caminos, Canales y Puertos.
- Montgomery, D.C. (2013) *Control Estadístico de la Calidad*. C.México: Limusa-Wiley.
- Kenett, R., and Shelemyahu, Z. (1998) *Estadística Industrial Moderna: Diseño y Control de la Calidad y la Confiabilidad*. Mexico: Thomson Editores.
- Martínez Almécija, A., Rodríguez Torreblanca, C., and Gutiérrez Jáimez, R. (1993) *Inferencia Estadística. Un enfoque clásico*. Madrid: Pirámide.
- Rossi, F., and Mirtchev, V. (2016) *Statistics for Food Scientists : making sense of the numbers*. New York: Academic Press.
- Rohatgi, V.K., and Ehsanes Saleh, A.K. Md. (2015) *An Introduction to Probability and Statistics*. New York: Wiley.
- Valderrama, M.J. (2010) *Biometría*. Granada: Sider S.C.



COMPLEMENTARY BIBLIOGRAPHY:

- Ardanuy, R., and Martín, Q. (1993) *Estadística para Ingenieros*. Salamanca: Hespérides.
- Bhargava, A. (2014) *Econometrics, Statistics, and Computational Approaches in Food and Health Sciences*. Singapore: World Scientific Publishing. Disponible en: ProQuest Ebook Central.
- Hoerl, R.W., y Snee, R. (2010) Statistical Thinking and Methods in Quality Improvement: A Look to the Future. *Quality Engineering*, 22(3), 119-129, DOI: 10.1080/08982112.2010.481485.
- Hubbard, M.R. (2003) *Statistical Quality Control for the Food Industry*. New York: Kluwer Academic.
- Jarvis, B. (2016) *Statistical Aspects of the Microbiological Examination of Foods (3ª Ed.)*. Amsterdam: Academic Press.
- Kenett, R.S., y Zacks, S. (2000) *Estadística Industrial Moderna*. Mexico: Thomson.
- Lara, A. M. (2002) *Estadística para ciencias biológicas y ciencias ambientales*. Granada: Proyecto Sur.
- Martín, A., y Luna, J.D. (1995) *50 ± 10 horas de Bioestadística*. Madrid: Norma.
- Sánchez, M., Frutos, G., y Cuesta, P.L. (1996) *Estadística y Matemáticas Aplicadas*. Madrid: Síntesis.
- Shewhart, W. (1986) *Statistical Methods from the view point of Quality Control*. New York: Dover.

RECOMMENDED INTERNET LINKS

- Department of Statistics and Operations Research: <http://www.ugr.es/~estadis>
- Campus de Cartuja's Unit: <http://www.ugr.es/~udocente/>
- SWAD: <http://swad.ugr.es>
- Prof. Francisco A. Ocaña's home page: <http://www.ugr.es/local/focana>

