UNIVERSIDAD DE MURCIA

FACULTY OF MATHEMATICS

System Reliability Analysis

Syllabus

Course code:	6391
Number of ECTS credits:	3
Semester:	2nd (February-June)
Recommended components:	Introduction to Probability and Statistics (1576, Degree in Mathematics), Characterization, classification and orderings of distributions (6377, Master). While strictly speaking only some standard knowledge of probability is required, the student will benefit from a background in characterization, classification and orderings of distributions).
Language of instruction:	Spanish (students are allowed to ask questions and write homeworks and exams in English). Some notes, papers and books will be provided in English.

Course description

In this course the student will get acquainted with some relevant topics from the theory of system reliability. This is currently an area of special interest, both from a theoretical point-of-view and for its usefulness in applied sciences.

In order that the course can be followed by as wide a range of students as possible, a "low-profile" syllabus has been devised, requiring only some standard background in real analysis, linear algebra and probability theory. This does not mean that the contents are uninteresting.

Learning outcomes and competences

After completion of this course you will:

1. understand the notion of coherent system.
2. know how to compute the reliability of a given coherent system.
3. know the basic representations and properties of the reliability of a system.
4. know how two compare different systems
5. know how to place the best components at a system structure.
6. know how to study the aging properties of a system.

Course contents

I. Reliability of coherent systems.

Coherent systems. Examples. Series, parallel and k-out-of-n systems. Order statistics. Representations as mixturs and generalized mixtures. Representations as generalized mixtures. Computation of the system reliability.

II. Preservation of ordering and aging classes under the formation of coherent systems.

Ordering and aging classification. Optimal positions for the components in a system. Dependence models.

References

1. Barlow RE, Proschan F. Statistical Theory of Reliability and Life Testing. Holt, Rinehart and Winston: New York; 1975.

2. Shaked M, Shanthikumar JG. Stochastic Orders. Springer: New York; 2007.

3. Samaniego FJ. System Signatures and their Applications in Engineering Reliability. In: International Series in Operations Research and Management Science, Vol. 110. Springer: New York; 2007.