25912 - Research methodology II

Información del Plan Docente

Academic Year	2017/18
Faculty / School	301 - Facultad de Ciencias Sociales y Humanas
Degree	270 - Degree in Psychology
ECTS	6.0
Year	2
Semester	First Four-month period
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The main methodology that will be used on the theoretical part of the course will be lectures, in which it will be explained different statistical concepts and the foundations of inferential statistics. In contrast, the main methodology on the practical part of the course will be problem solving tasks, which will be solved either by hand or by computer. The target of these tasks is to carry out inferential statistics exercises. Besides these methodologies described previously, students could make use of tutorials, as a way to solve doubts about the contents of the topics that are being developing in class.

25912 - Research methodology II

5.2.Learning tasks

Learning tasks will consist mainly on univariate inferential statistical problems to be solved either by hand or by computer.

5.3.Syllabus

LESSON 1. Introduction
1. What is statistical analysis?

1. Descriptive statistics
2. Inferential statistics

2. Levels of inquiry

1. Descriptive
2. Relational

3. Explanatory

LESSON 2. Introduction to probability

1. Definitions

1. Elements
2. Types of sampling space

2. Types of experiments

1. Deterministic
2. Random

3. Definition of probability

1. Classic view or a priori
2. Frequentist view or a posteriori

4. Conditional probability

5. Basic Theorems

1. Addition theorem
2. Product theorem

25912 - Research methodology II

LESSON 3. Sampling

1. Basic concepts

1. Population and parameter
2. Sample and statistic

1. Types of sampling

1. Random sampling with replacement (Simple random sampling)
2. Random sampling without replacement

3. Other types of random sampling

1. Systematic
2. Stratified
3. Clusters

LESSON 4. Sampling distributions

1. Basic concepts

1. Deterministic and random experiment

2. Random variable

3. Probability function and distribution function

2. Sampling distribution

1. Definition
2. Example of sampling distribution
3. Characterization of a sampling distribution

1. Shape
2. Mean
3. Standard deviation (Standard error)

3. Sampling distribution of the mean (Normal curve and Student's t distribution)

1. Central limit theorem
2. Normal curve

25912 - Research methodology II

1. Normal curve properties
2. Standardization of a variable

3. Student t distribution

1. Conditions that bring about a Student's t distribution
2. Properties

4. Sampling distribution of the variance (Pearson's X2 distribution)

1. Conditions that bring about a Pearson's X2 distribution
2. Properties

5. Sampling distribution of the proportion (Binomial distribution)

1. Conditions that bring about a Binomial distribution
2. Properties

6. Sampling distribution of two variances (Snedecor's F distribution)

1. Conditions that bring about a Snedecor's F distribution
2. Properties

LESSON 5. Parameters estimation
1. Point estimation

1. Definition
2. Properties of a good estimator

1. Lack of bias
2. Consistency
3. Efficiency
4. Sufficiency

3. Confidence interval estimation

1. Definition
2. Definition of confidence level (1-α) and risk level (α)
3. Relation between amplitude and confidence level
4. Relation between amplitude and accuracy (Maximum error)
5. Confidence interval estimation for the mean

1. With a large sample
2. With a small sample

25912 - Research methodology II

6. Confidence interval estimation for the variance

1. Using X2
2. Using normal approximation

7. Confidence interval estimation for the proportion

1. With a large sample
2. With a small sample

4. Accuracy and simple size

1. For the mean

1. With a large sample
2. With a small sample

2. For the variance
3. For the proportion

LESSON 6. Contrasts hypothesis
1. Definition
2. Differences between scientific hypothesis and statistical hypothesis
3. Statistical hypotheses

1. Null hypothesis
2. Alternative hypothesis

4. Unilateral and bilateral hypothesis
5. Assumptions
6. Contrast statistics
7. Decision rule

1. Rejection region (critical region)
2. Acceptance region

8. Decision

1. Meaning of rejecting a null hypothesis
2. Meaning of rejecting an alternative hypothesis

9. Type error I, type error II, α and β
10. Three factors that β depends on

25912 - Research methodology II

1. Distance that separates null hypothesis distribution from alternative hypothesis distribution
2. Value of α
3. Size of standard error of sampling distribution

11. Critical level

1. For unilateral contrast
2. For bilateral contrast

12. Relation between interval estimation and contrast hypothesis

LESSON 7. Contrasts hypotheses for the mean
1. Contrasts hypotheses for one mean

1. When we know population variance (Normal distribution)
2. When we do not know population variance and the simple is small (Student's t distribution)

2. Contrasts hypotheses for two independent means

1. Assuming equal variances
2. Assuming different variances

3. Contrasts hypotheses for two related means
4. Effect size for contrast of the mean

LESSON 8. One-way analysis of variance
1. General linear model
2. Introduction to analysis of variance

1. Models of ANOVA
2. The logic behind the ANOVA

3. One-way ANOVA, fixed effects, completely random

1. Data structure and notation
2. The model
3. Assumptions
4. Contrast statistic
5. Model summary

4. One-way ANOVA, fixed effects, repeated measures

25912 - Research methodology II

1. Data structure and notation
2. The model
3. Assumptions
4. Contrast statistic
5. Model summary

5. Fixed effects and random effects
6. Effect size measures

5.4.Course planning and calendar

The general planning of the student dedication, in funtion on the type of the activity, is the following:

- 60 hours in lectures in class
- 60 hours in problem solving tasks in class
- 30 hours in autonomous works (study hours at home)
- 2 hours in performing the exam

5.5.Bibliography and recommended resources

To access to the bibliography of the course, please, search the course in the library of Zaragoza University in the following webpage:

http://psfunizar7.unizar.es/br13/eBuscar.php?tipo=a