VNIVERSITAT Ð VALÈNCIA

COURSE DATA

Data Subject	
Code	41090
Name	Odontologic research methodology
Cycle	Master's degree
ECTS Credits	15.0
Academic year	2020 - 2021

Study (s)			
Degree	**Center**	**Acad. year**	**Period**
2006 - M.U. en Ciencias Odontológicas 09-V.1	Faculty of Medicine and Odontology	1	First term

Subject-matter		
Degree	**Subject-matter**	**Character**
2006 - M.U. en Ciencias Odontológicas 09-V.1	1 - Methodology of dentistry research	Obligatory

Coordination	
Name	**Department**
ALMERICH SILLA, JOSE MANUEL	131 - Stomatology

SUMMARY

The first 5 credits of this subject will be destined to the knowledge and training in the Method and the scientific Logic as well as in the Design and the Work planning scientist. On the other hand there will develop a few formative activities that will be directed to the knowledge and training on the part of the student of those tools that the statistical analysis contributes to the scientific methodology. The scientific works of rigor demand a statistical precise methodology, so much in the statistical descriptive analyses as inferences and in all the tests necessary for his validation. For his correct learning 6 credits will destine of this subject to the Statistics. The learning of the Physical Bases for the investigation in dentistry and the Digital Analysis of Signs and Images, elements necessary both in the scientific formation of the student will occupy 4 credits inside this first subject.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The profile of recommended revenue is Licentiate or grade in Dentistry, Licentiate or grade in medicine and Medical specialists in Stomatology
Previous competences recommended for a better utilization of the master:
Knowledge of English language (level of reading and comprehension of scientific texts in the area of the Sciences of the Health).
Knowledge of computer science to level of advanced user of programs Word, Excel, Acces, Powertpoint.

OUTCOMES

2006 - M.U. en Ciencias Odontológicas 09-V.1

- Saber aplicar los conocimientos adquiridos y ser capaces de resolver problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.

- Saber comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.

- Poseer las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

- Ser competentes en el desarrollo de las técnicas de investigación propias del ámbito de la Estomatología y la Odontología, así como en la evaluación e interpretación de los resultados obtenidos mediante las mismas.

- Ser capaces de trabajar en un grupo de investigación consolidado.

- To have the ability to choose the more suitable laboratory technique or techniques to deal with the research problem set out.

- Be able to integrate knowledge and handle the complexity of formulating judgments based on information that, while being incomplete or limited, includes reflection on social and ethical responsibilities linked to the application of knowledge and judgments.

- Describir y sintetizar adecuadamente el conjunto de datos observado en el experimento.

- Analizar los datos observados utilizando algún paquete estadístico.

- Interpretar correctamente los resultados proporcionados por paquetes estadísticos.

- Ser capaces de desarrollar un razonamiento lógico y científico en el marco de la investigación odontológica.
- Diseñar experimentos útiles para alcanzar los objetivos del estudio.
- Extraer conclusiones a partir de la información estadística obtenida.

LEARNING OUTCOMES

The application of the acquired knowledge and the aptitude to solve problems in environments new or little known inside more wide contexts (or multidisciplinary) related to his area of study (competence number 1).

The aptitude to integrate knowledge and to face the complexity of formulating judgments from an information that, being incomplete or limited, includes reflections on the social responsibilities and ethics linked to the application of his knowledge and judgments (competence number 2).

The communication of conclusions (and the knowledge and last reasons that sustain them) to public specialized and not specialized in a clear way and without ambiguities (competence number 3).

The skill to continue studying of a way self-guided or autonomous (competence number 4).

The work in a group of investigation consolidated (competence number 5).

The development of the own technologies of investigation of the area of Dentistry, as well as in the evaluation and interpretation of the results obtained by means of the same ones (competence number 6).

The choice of the technology or laboratory technologies most adapted to the problem of investigation raised (competence number 7).

The development of a logical and scientific reasoning in the frame of the dentistry investigation (competence number 8).

The design of useful experiments to reach the aims of the study (competence number 9).

The description and suitable synthesis of the set of information observed in the experiment (competence number 10).

The analysis of the observed information using some statistical package (competence number 11).

The correct interpretation of the results provided by statistical packages (competence number 12).

The extraction of conclusions from the statistical information obtained (competence number 13).

DESCRIPTION OF CONTENTS

1. METHODOLOGY OF THE INVESTIGATION IN DENTISTRY

Theory:

The scientific method and the phases of an investigation.

Design of research studies.

Ethics in research.

Sampling and sample size. Power of a study.

Frequency and association measures.

Sensitivity and Specificity Analysis. Analysis of concordance and survivorship.

Design and validation of questionnaires.

Preparation of a research protocol.

Practice:

Methodology, analysis and interpretation of a cross-sectional study.

Methodology, analysis and interpretation of a case-control study.

Methodology, analysis and interpretation of a cohort study.

Methodology, analysis and interpretation of an experimental study.

Methodology, analysis and interpretation of diagnostic tests.

Methodology, analysis and interpretation of questionnaire validations.

2. BIOSTATISTICS IN DENTISTRY

The Biostatistics like tool of investigation Foundations of the Biostatistics.

Design and statistical analysis of experimental information.

Linear Regression and widespread.

Models Technical multivariants of classification

BIOSTATISTICS IN DENTISTRY

BIOSTATISTICS IN DENTISTRY

BIOSTATISTICS IN DENTISTRY

Theory and practice

Biostatistics as a research tool

Working with variation

Contrast hypothesis: T tests

Analysis of non-normal data

One way ANOVA

Multivariate ANOVA

Correlation and Regression

ANCOVA and repeated measures.

Categorical data analysis.

3. PHYSICAL BASES FOR THE INVESTIGATION IN DENTISTRY

BIOMECHANICS
-Newton's laws. Forces and moments applied to dental structures. Leverage effect.
ELASTIC PROPERTIES OF MATERIALS
-Structure of solids. Elasticity concept. Elastic test. Module and Elastic Constant concepts.
-Elastic tensile test. Tensile strain and deformation: Hooke's Law. Young's module. Poisson's coefficient.
-Other elastic tests: shear, volumetric compression, bending and torsion.
-Fractures of dental pieces. Impact fracture.
PHYSICAL PROPERTIES OF LIQUIDS
-Surface tension. Wetting and surfactant substances. Solid-liquid contact angles. Capillarity phenomena. Dental applications.
-Viscosity. Newtonian liquids. Factors that influence the viscosity. Factors that influence viscosity. Viscoelastic materials and their dental interest.

4. DIGITAL ANALYSIS OF SIGNS AND IMAGES IN DENTISTRY

OVERVIEW OF THE IMAGE
-The eye: sensor of human vision.
-Formation of the image: object, lens and sensor.
-Sampling and quantification.
-Monochrome and colour images.
-Storage of images. Formats.
PROCESADO DIGITAL DE IMAGEN.
-Contrast and brightness.
-The histogram Modification of the histogram.
-Image filters.
-Segmentation by areas of interest.
IMAGING SYSTEM I
-Introduction.
-Visible image. Photography. Intraoral scan.
-Radiological image I: Radiography. Orthopantomography.
IMAGING SYSTEM II
-Radiological image II: TAC. CBCT.
-Electronic image formats.
PRACTICAL APPLICATIONS OF THE DIGITAL TREATMENT OF MEDICAL IMAGES
-Introduction.
-Co-record of multimodal medical images: rigid fusion and deformable fusion.
-Segmentation of medical images. Manual segmentation and automatic segmentation: examples.
Visualization of medical images: level and window.
PRACTICE: ACQUISITION AND TREATMENT OF THERMOGRAPHIC IMAGES
-Basis.
-Applicability.
PRACTICE: TREATMENT OF IMAGES OBTAINED WITH CBCT.
-Basis.

-Applicability.
PRACTICE: TREATMENT OF MEDICAL IMAGE I
-Colour, colour depth, RGB channels.
-Level and window in a digital medical image.
-Image resolution.
PRACTICE: TREATMENT OF MEDICAL IMAGE II
-Measure distances and angles.
-Improvement of the image by manipulation of the histogram.
-Subtraction of images. Its application in medical images.

WORKLOAD

ACTIVITY	Hours	% To be attended
Laboratory practices	37,50	100
Seminars	25,50	100
Theory classes	15,00	100
Tutorials	7,00	100
Other activities	3,00	100
Development of group work	40,00	0
Development of individual work	40,00	0
Study and independent work	127,00	0
Readings supplementary material	40,00	0
Resolution of case studies	40,00	0
TOTAL	**375,00**	

TEACHING METHODOLOGY

The methodology will be: magisterial classes with support of projectors with presentations type power-point, practical classes with computers and diverse devices, classes of laboratory, as well as individual works and in group.

EVALUATION

The general assessment of the module will consist of the valuation of the assistance to the theoretical classes as well as the participative attitude (1/3 of the final note), close to the valuation of the works proposed (1/3 of the note) close to an multiple-choice question test about the contents of the module (1/3 of the note).

Module of Physical Bases and Digital Analysis of signals and images (for evaluation on 10 points):

-Written exam consisting of 6 short answer questions: evaluation up to 6 points.

-Written memories of the Thermography and CBCT practices: evaluation up to 4 points.

Attendance at 80% of the practices is compulsory.

REFERENCES

Basic

- Estadística para la investigación biomédica. Armitage P; Berry G.
  Ed. Harcourt Brace (1997)

- Métodos de investigación en odontología. Bases científicas y aplicaciones del diseño de la investigación clínica en las enfermedades dentales. Ramón Torrell J.M. Ed. Elsevier Masson (2009).

- KANE JW, STERNHEIM MM. Física. Ed. Reverte

- CROMER AH. Física para las ciencias de la vida. Ed. Reverte.

- GONZÁLEZ RC, WINTZ P. Procesamiento digital de imágenes. Ed. Addison-Wesley.

- GLASSNER AS. Principles of Digital Image Synthesis. M. Kaufmann Publ. Inc.

Additional

- CARLYLE. Radiologic science for technologist: physic, biology and protection. ISBN: 9780323048378.
  - ELETA F. Diagnóstico por imágenes. ISBN: 9789870550501.
  - FRAILE, FJ. Imagen radiológica. Principios físicos e instrumentación. ISBN: 9788445814505.
  - GIBSON R. Essential medical imaging. ISBN: 9780521709118.
  - GONZÁLEZ RC, WOODS RE, EDDINS SL. Digital Image processing using MATLAB. ISBN: 0130085197.
  - LEONDES CT ed. Medical Imaging Systems Technology. ISBN: 9812563644.
  - METTLER F. Medical effects of ionizing radiation. ISBN: 978072160.
  - NIBLACK W. An introduction to digital image processing. Prentice-Hall, London.
  - SEMMLOW JOHN L. Biosignal and biomedical image processing: MATLAB-based applications. ISBN: 824748034.
  - SUETENS P. Fundamentals of medical imaging. ISBN: 9780521803625.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available