

Scientific Methodology and Biostatistics

Code: 106104
ECTS Credits: 6

Degree	Type	Year	Semester
2500891 Nursing	FB	1	2

Contact

Name: Maria Feijoo Cid

Email: maria.feijoo@uab.cat

Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Sandra Cabrera Jaime

Pablo Rodríguez Coll

Albert Navarro

Rosa García Sierra

Prerequisites

none

Objectives and Contextualisation

This subject contains the basic training in scientific methodology and biostatistics of the degree. Nurses, when practicing their profession, face a set of situations-problems that put their abilities to the test (selection of information, organization of reasoning, distinction between the fundamental and the accessory, statistical interpretation of health problems, etc.)

The purpose is to structure a critical and thoughtful thinking that allows the critical reading of research in health sciences and the analysis of health problems using statistics to promote a practice nurse of excellence.

The subject raises the basic knowledge and skills to apply in the accomplishment of the degree's final project.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Base nursing interventions on scientific evidence and the available media.
- Demonstrate knowledge of health information systems.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Use scientific methodology in interventions.

Learning Outcomes

1. Analyse the problems, prejudices and discrimination in the short and long term in relation to certain people or groups.
2. Critically analyse the principles and values that regulate the exercising of the nursing profession.
3. Demonstrate skills in bibliographical searches.
4. Describe the characteristics of the main information systems.
5. Describe the concepts of science, scientific research and the scientific method.
6. Describe the ethical principles involved in nursing research.
7. Draw up research questions based on scientific evidence.
8. Identify elements that belong to the research process.
9. Identify the different research methods in the health sciences.
10. Identify the need to research and use scientific evidence in care.
11. Interpret statistical and qualitative data and their possible repercussions in clinical practice.
12. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.

Content

Below is a brief description of the subject:

1. Bases of scientific knowledge: Sources and types of human knowledge. The scientific method. the scientific method's characteristics and limitations.
2. Quantitative and qualitative methodologies: Introduction and differences between both.
3. Research process: Relationships between the scientific method, the research process and a scientific article.
4. Research problem and hypothesis formulation.
5. Review and bibliographic search.
6. Study design.
7. Sample and Population.
8. Methods of data collection.
9. Evaluation of scientific articles: internal validity and external validity.
10. Evidence Based Nursing.
11. General concepts of statistics: basic terminology of research and statistics. Principles of the measure
12. Recollection, tabulation and graphic presentation of results. Basic principles of descriptive inferential statistics.
13. Handling of statistical data files.
14. Presentation and interpretation of results in scientific articles

Methodology

The learning methodologies are the backbone for the achievement of both theoretical content and skills involved in reflective-critical thinking when solving nursing problems based on the scientific method. The following is a brief description of each learning methodology

In Theory, necessary theoretical contents of the scientific methodology block and the biostatistics block will be taught.

In the seminars (SEM) the students will work in small groups. This type of teaching belongs to the scientific methodology block. They will be introduced to the critical and reflective reading of original articles in the field of nursing and/or health sciences. As an example look at the [Impacto en la salud del programa de intervención comunitaria «Educación para la salud en la adolescencia»](#). These seminars will help to identify and discuss about real examples (original/scientific articles) the theory previously done. The original articles reflect the results of some of the nursing interventions. The critical reading of those articles will guide the nursing decision making based on the scientific method.

The laboratory practices (Plab) belong to both blocks: 14h to biostatistics and 3h to scientific methodology. In the practices belonging to the biostatistics block, quantitative data will be analyzed with quantitative analysis software; in the practices belonging to scientific methodology, information searches will be carried out in scientific databases after planning the search. The analysis of quantitative data will be used to carry out the integrative project. The integrative project is intended to be a work that combines knowledge and skills from both blocks.

In the classroom practices (PAUL), the integrative project will be carried out in one of the research diffusion forms. In the PAUL the writing and development of each corresponding part of the work will be guided: introduction, material and methods; results, conclusions and practice implications. The research problem will be previously defined by the subject coordinator and will be the same for the entire first course. In the PAUL, work will be done in the same small groups previously created in the seminars.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
CLASSROOM PRACTICES	8	0.32	2, 1, 3, 6, 7, 8, 10, 11, 12
LABORATORY PRACTICES	17	0.68	3, 4, 7, 12
SEMINARS	12	0.48	2, 1, 5, 6, 7, 8, 9, 10, 12
THEORY	28	1.12	2, 1, 5, 4, 6, 7, 8, 9, 10, 11, 12
Type: Supervised			
TUTORIALS	1	0.04	2, 6, 7, 8, 9, 10, 11, 12
Type: Autonomous			
Self study	76	3.04	3, 5, 4, 7, 8, 9, 10, 11

Assessment

ONGOING EVALUATION

The subject is presented in two evaluation blocks: scientific methodology (MET) and biostatistics (BIO) with

different evaluation activities. All the evaluation activities are compulsory, in case of not presenting it will be graded as Not Evaluable (NA) and will be quantified as zero (0).

The score of each knowledge block of the subject (scientific methodology and biostatistics) is the weighted average of the different evaluation activities of each block. In order to pass the course, it is necessary to obtain a minimum of 5.0 in the final score. When the ongoing evaluation is failed, the student can take the recovery. It must be taken into account that, according to general regulations, in order to participate in the final retake exam, students must have been previously evaluated in a set of activities whose weight is equivalent to a minimum of two thirds of the total grade of the subject. This recovery test will include all the subject matter of the failed knowledge block.

The evaluation activities of each block are described in the table. From these six evaluative activities two scores are generated, one for each block of the subject. The evaluation of the subject is broken down as follows:

(AV1) Objective test: Final exam on scientific methodology: 25%. This test will be a multiple-choice exam on theory contents, information searches in scientific databases and questions on the abstract of an original article.

(AV2) Oral evaluation: structured tests (scientific methodology: 10%. This test consists of a group work that includes oral defense and delivery of a paper on the critical reading of an original article.

(AV3) Delivery of work: Integrated work (scientific methodology): 15%.

(AV4) Objective test: biostatistics partial exam: 5% (AV5) Objective test: biostatistics partial exam: 5%.

(AV5) Objective test: biostatistics final exam: 30%.

(AV6) Submission of work: Integrated work (biostatistics): 15%.

From these six evaluative activities, two grades are generated, one for each block of the course; scientific methodology grade (MET grade) and biostatistics grade (BIOStatistics grade).

From these six evaluative activities two scores are generated, one for each block of the subject; scientific methodology score (NotaMET) and biostatistics grade (NotaBIO).

NotaMET: scientific methodology score from AV1, AV2 and AV3.

In order to obtain this score it must be fulfilled that: Av1 is equal or higher than 4 and AV2 is equal or higher than 4.0 and AV3 is equal or higher than 4.0. If $AV1 < 4.0$ or $AV2 < 4.0$ or $AV3 < 4.0$ the student will have to take the recovery exam of the Scientific Methodology block where he/she will obtain the recovery score of that block (NoteMETRec). NotaMETRec recovers 100% of the Scientific Methodology block, it means that the final score of this block will be NotaMETRec for those students who have taken the recovery exam, without averaging in any case with AV1, AV2 or AV3.

NotaBIO: Biostatistics score from AV4, AV5 and AV6. In order to obtain this score it must be fulfilled that: AV5 is equal to or greater than 4.0 and AV6 is equal to or greater than 4.0. If $AV5 < 4.0$ or $AV6 < 4.0$ the student will have to take the recovery exam of the Biostatistics blog where he/she will obtain the recovery score of that block (NotaBIORec). NotaBIORec recovers 100% of the Biostatistics blog, which means that the final score of this blog will be NotaBIORec for those students who have taken the recovery exam, without averaging in any case with AV4, AV5 or AV6.

The final score of the subject (NotaFINAL) will be the average of NotaMET and NotaBIO. To pass the subject it is necessary to obtain a minimum of 5.0 in the final score, otherwise, the failed block will be recovered.

- a) If theMET score is equal or higher than 4.0 and theBIORec score is equal or higher than 4.0, theFINAL score will be the average of theMET score and theBIORec score.
- b) If NotaMET equal or higher than 4.0; NotaBIO < 4.0 and NotaBIORec equal or higher than 4.0 the NotaFINAL will be the average of NotaMET and NotaBIORec.
- c) If NotaMET < 4.0, NotaMETRec equal or higher than 4.0 and NotaBIO equal or higher than 4.0 the final grade will be the average of NotaMETRec and NotaBIO.
- d) If NotaMET < 4.0; NotaMETReco equal or higher than 4.0; NotaBIO < 4.0 and NotaBIORec equal or higher than 4.0 the final grade will be the average of NotaMETRec and NotaBIORec.
- e) If NotaMETRec < 4.0 or NotaBIORec < 4.0; the final grade will be the average of case b), c) or d), as appropriate, provided that this average is less than 5, or will be set at 4.3 if greater than 5.

Definition of NOT ASSESSABLE (NA): In each block of knowledge, it will be understood as Not Assessable (NA) that situation in which the student does NOT present 50% or more of the evaluation activities. Likewise,

having a NA in one of the blocks of the subject, will mean a NA in the whole subject.

Test Review: all students have the right to review the evaluation tests by appointment with the corresponding teacher. The review will consist of an individual tutoring session in which students will receive feedback regarding their evaluation.

The treatment of particular cases will be made from a teaching committee (formed by the subject coordinator, and 2 of the teachers of the same, 1 from each department involved) where the particular situation of each student will be evaluated and the most appropriate decisions will be taken.

ONE-TIME EVALUATION:

Students who wish to add to the single evaluation must do so following the deadlines established by academic management. The same day of the single evaluation will be evaluated the whole course with its corresponding evaluation activities. The course is presented in two evaluation blocks: scientific methodology (MET) and biostatistics (BIO) with different evaluation activities. The evaluation activities are the following:

1. scientific methodology block^{AU} (50%): Two multiple-choice exams (Ex1MET^{AU} (25%) and Ex2MET^{AU} (25%)). Exam 1 will consist of questions associated to the theoretical content and questions associated to the search of information in scientific databases. Exam 2 will consist of multiple-choice questions associated with the critical reading of an original article. This original article will be made available to students via Moodle and must be printed out on the day of the evaluation. As an example, look at the health [Impacto en la salud del programa de intervención comunitaria «Educación para la salud en la adolescencia»](#)
2. Biostatistics block^{AU} (50%): will be evaluated with a multiple-choice exam (ExBIO^{AU}). The exam will consist of questions associated with theory content, data analysis with computer software and statistical calculation. There will also be questions on the original article to be printed

From these three evaluative activities two scores are generated, one for each block of the course; scientific methodology score (NotaMET^{AU}) and biostatistics grade (NotaBIO^{AU}). The final score of the subject (NotaFINAL^{AU}) will be the average of NotaMET^{AU} and NotaBIO^{AU}. To pass the subject it is necessary to obtain a minimum of 5.0 in the final score. The calculation of the final score of the subject will be done in the following way:

MET^{AU} score: score for Scientific Methodology single evaluation (from the 2 multiple-choice exams Ex1MET^{AU} and Ex2MET^{AU}).

In order to obtain this score it must be fulfilled that: Ex1MET^{AU} equal or higher than 4.0 and Ex2MET^{AU} equal or higher than 4.0; if you do not reach 4.0 in each of the scientific methodology exams you will not be able to average with the other block of knowledge and you will fail the subject and will have to go to recovery.

NotaBIO^{AU}: score of Biostatistics single evaluation (from 1 multiple-choice exam (ExBIO^{AU})).

In order to obtain this score, the following must be fulfilled: ExBIO^{AU} equal or higher than 4.0; if the 4.0 is not reached, it cannot be averaged with the other block of knowledge and the student will fail and will have to go to recovery.

The retake of the one-time evaluation takes place on the same day as the retake of the ongoing evaluation. In the recovery the students will be evaluated of the failed block in the case of biostatistics and/or of the failed exam/s in scientific methodology. The number of exams and structure will be the same as those of the single evaluation of the failed block but another original article will be proposed to be printed.

The calculation of the final score of the course follows the same criteria: a minimum of 4 must be obtained in each exam to be able to average, as well as a minimum of 4 must be obtained in each block of knowledge to be able to average. A minimum of 5.0 in the final score is required to pass the course during the recovery.

The review of the final score (including that of the retake) follows the same procedure as for the ongoing evaluation.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation by submitting written works (Integrative project)	30%	2	0.08	2, 1, 3, 5, 6, 7, 8, 10, 11, 12
Objective written test evaluations (1 partial scientific methods test)	25%	2	0.08	1, 3, 5, 4, 6, 7, 8, 9, 10, 11, 12
Objective written test evaluations (2 partial biostatistics tests)	35%	2	0.08	1, 7, 11, 12
Oral evaluation: structured examinations (scientific methodology)	10%	2	0.08	

Bibliography

Selected references:

1. Albert Navarro Giné, Sergio Salas Nicás. Iniciación a la bioestadística para enfermería y otras profesiones sanitarias. Bellaterra: Universitat Autònoma de Barcelona, Servei de Publicacions, 2021.
2. Josep M. Argimon Pallás, Josep Jiménez Villa. Métodos de investigación clínica y epidemiológica. 5ª ed. Barcelona: Elsevier, España, SA, 2019.
3. Susan K. Grove, Jennifer R. Gray, Nancy Burns. Investigación en enfermería. Desarrollo de la práctica enfermera basada en la evidencia. Madrid. Elsevier. 6a ed. 2019
4. Bee, P.; Brooks, H.; Callaghan, P. and Lovell. K. A research handbook for patients an public involvement. Manchester, Manchester University Press, 2018.
5. Denise F. Polit, Cheryl Tatano Beck. Essentials of nursing research: Appraising Evidence for Nursing Practice. Philadelphia : Wolters Kluwer/Lippincott/Williams & Wilkins Health. 8th ed. 2018

Referral bibliography:

1. Nancy Burns, Susan K. Grove. Investigación en enfermería. Madrid. Elsevier 5a ed. 2016.
2. Wayne W. Daniel. Bioestadística: base para el análisis de las ciencias de la salud. México: Limusa, 2002.
3. Erik Cobo, Pilar Muñoz, José Antonio González. Bioestadística para no estadísticos: principios para interpretar un estudio científico P, González JA. Barcelona: Elsevier Masson, 2007.

Internet Sources

1. <https://doaj.org/>
2. <http://www.ncbi.nlm.nih.gov/pubmed>
3. <http://www.scopus.com/home.url>
4. <http://www.easp.es/exploraevidencia/>
5. <http://www.fisterra.com/>

Software

The Jamovi statistics program is used in the biostatistics laboratory practices.

