Universidad de Navarra

Basic Computing and Bibliographic Research Techniques

Teaching guide 2026-27

INTRODUCTION

Brief description:

This course introduces students to the preparation of scientific documents. It covers data processing and its representation in tables and graphs using spreadsheets, conducting literature searches (both Boolean and using artificial intelligence), understanding the keys to the ethical use of retrieved scientific information, and the application of the basic principles of scientific writing. The use of Generative Artificial Intelligence in literature searching and scientific communication will also be addressed.

- **Degree:** Biology and Biochemistry
- **Module in the Degree Program**: *Biology:* Module 5. Applied instrumental and computational methods in biology. *Biochemistry:* Module 4. Instrumental and computational methods in biomedical research.
- **Number of credits:** 3 ECTS
- **Year:** First, 1st semester
- **Type of course:** Compulsory
- **Instructors**: Dr. Inmaculada Pascual (course coordinator) and Dr. Iker Zuriguel
- **Language:** English
- **Classroom. Schedule:** Classroom 17. Monday, January 11 at 9:00 AM, and Wednesdays, from January 13 to March 10, at 8:00 AM.

COMPETENCIES

BIOLOGY

- RA1 Describir los principios de la metodología científica en Biología
- RA2 Aplicar las bases de Matemáticas, Física, Química, Bioestadística y Bioinformática en los estudios de Biología
- RA7 Describir los principales conceptos y herramientas asociados a la búsqueda y gestión de información científica y técnica
- RA12 Analizar de forma crítica datos procedentes de estudios bibliográficos y experimentales en los ámbitos de la investigación básica, biomédica, industrial y medioambiental
- RA13 Comunicar de modo eficaz, tanto de forma oral como escrita, aspectos científico-técnicos que permitan una correcta didáctica y divulgación de la Biología
- RA18 Valorar de forma crítica la información científica procedente de diferentes fuentes, emitiendo juicios argumentados basados en evidencia contrastada
- RA22 Analizar en profundidad los fundamentos antropológicos y éticos de la propia disciplina aplicándolos a la realidad profesional
- RA25 Interpretar de manera crítica y reflexiva los presupuestos, metodologías y problemáticas de la propia disciplina en su conexión con el resto de los saberes

BIOCHEMISTRY

- RA1 Exponer los métodos científicos y los principios de estudio y análisis de la organización y función de los sistemas biológicos a escala molecular, así como las aplicaciones tecnológicas de los procesos bioquímicos
- RA2 Aplicar las matemáticas, la estadística y la informática para obtener, analizar e interpretar datos y para elaborar modelos de los sistemas y procesos bioquímicos

- RA15 Resolver problemas cualitativos y cuantitativos en el campo de la Biomedicina a través de hipótesis científicas que puedan examinarse empíricamente, aplicando, en su caso, los conocimientos de informática y biología computacional
- RA18 Gestionar la información, desde su búsqueda y evaluación crítica, hasta su análisis, síntesis y resumen, para lograr una comunicación rigurosa al citar y presentar trabajos
- RA19 Comunicar nuevos conocimientos sobre temas de biomedicina molecular de forma oral, escrita y visual, con un estilo y un lenguaje adaptado a las distintas audiencias
- RA20 Analizar críticamente los problemas en estudio, discutiendo, escribiendo y presentando argumentos científicos
- RA22 Emitir juicios fundamentados sobre cuestiones sociales, científicas o éticas, a partir del análisis de datos relevantes y de la identificación crítica de fuentes de información fiables
- RA23 Interpretar de manera crítica y reflexiva los presupuestos, metodologías y problemáticas de la propia disciplina en su conexión con el resto de saberes
- RA25 Analizar en profundidad los fundamentos antropológicos y éticos de la propia disciplina aplicándolos a la realidad profesional

PROGRAM

Theoretical Program

Topic 1. Information and scientific literature. Information literacy. Information on the Internet. Characteristics of scientific information production. Sources of scientific information.

Topic 2. Bibliographic databases in the scientific field. Tools for searching scientific information. Construction of search strategies. Evaluation of results. Integration of generative AI (large-scale language models, LLMs) into bibliographic databases: pros and cons.

Topic 3. Ethical use of information. Plagiarism, its typologies and possible causes. Citations and bibliographic references. Keys to the ethical and responsible use of generative AI.

Topic 4. Writing scientific texts. Structure of a scientific document. Section-by-section writing: normative content, tools and writing advice. Application of the principles of rigor, clarity and precision in the communication of experimental results.

Theoretical-Practical Program

Boolean bibliographic search with Pubmed and Web of Science

Introduction to Generative Artificial Intelligence

- Large Language Models (LLMs): conversational assistants vs. research and knowledge management assistants, prompt engineering, and critical analysis (hallucination detection).
- Generative AI in bibliographic searching and scientific communication: traditional bibliographic searching (in PubMed / Web of Science) vs. search assisted by generative AI (Scopus AI or equivalent). Analysis of differences in the results obtained, detection of potential errors, biases, or hallucinations, verification of retrieved references, and justification of valid sources for academic work.

Data management and analysis with Excel

- Data importing and cloud storage (Google Drive). Position references and cell formatting
- Basic formulas and operations. Conditional logical functions and automation of decision-making. Simultaneous inter-sheet operations
- Design and editing of graphs

- Table management
- Linear regression and frequency analysis
- Handling large volumes of data: pivot tables and pivot chart

EDUCATIONAL ACTIVITIES

Classroom teaching activities (30 h)

Lectures (9 h). Explanatory classes in which the theoretical syllabus will be developed

Seminars and workshops (9 h)

- *Analysis of a scientific article* (1 hour). Applied exercise on the structure and writing of a scientific article. It will include a critical evaluation activity on the use of generative AI to summarize, locate information, formulate bibliographic questions, or review the clarity of a scientific text, always verifying the information with reliable sources.
- *Boolean bibliographic search with PubMed and Web of Science* (4 hours).
- *Introduction to Generative AI* (4 hours). Large language models, generative AI in bibliographic searching and scientific communication.

Practical classes (12 h)

- *Data management and analysis with Excel.* Sessions based on the resolution of cases and practical problems in the biological and biochemical field.

Personal work (45 h)

Practical exercises (5 h). Practical exercises posed by the professor during the practical sessions so that each student reinforces the concepts studied. Doubts about them will be resolved in the following session.

Personal study (40 h). Personal study work to assimilate the information presented in the in-person theoretical and practical sessions.

Office hours

Resolution of doubts and support to achieve the required learning outcomes.

Final evaluation

Theoretical and practical final exams to evaluate the achievement of the learning outcomes.

ASSESSMENT

Ordinary call

The course performance and grading will be determined as follows:

- **Theoretical exam** (30%). Multiple-choice test exam with 40-50 questions.
- **Practical exam** (50%). Exercises on bibliographic searches and Excel to be solved in the computer room.
- **Scientific article analysis** (10%). Applied exercise on the structure and writing of a scientific article.
- **Quick in-class tests** using Wooclap questionnaires (10%)

Requirements to pass the course

To pass the course, it will be necessary to meet the following conditions:

1. Obtain a minimum grade of **4 out of 10** in both the theoretical and practical exams
2. Obtain a minimum grade of **5 out of 10** in the final grade

Students repeating the course will take a theoretical and a practical exam in the computer room (bibliographic searches and excel) with similar characteristics to those of the ordinary call and with the same percentage weight in the final grade. The grades corresponding to both the scientific article analysis (10%) and the quick in-class tests (10%) will be maintained, provided they are passed (5 out of 10). In the event that they are not, the grade of the theoretical test will be considered to calculate this 20%.

Extraordinary call

In the extraordinary call, the student will take a theoretical and a practical exam in the computer room (bibliographic searches and excel) with similar characteristics to those of the ordinary call and with the same percentage weight in the final grade. The grades corresponding to both the scientific article analysis (10%) and the quick in-class tests (10%) will be maintained.

Students who have passed the course in the ordinary call may request to be evaluated in the extraordinary call of that academic year. To do so, they must request it, via a formal application form, at least 5 days before the start of the extraordinary call exam period. The final grade for the course will be the one obtained in the extraordinary call, even if it is lower than the one obtained in the ordinary call.

Students with special educational needs

For students with special educational needs, exceptions regarding the methodology and/or evaluation of the course will be permitted. Possible alternatives will be studied provided they guarantee the effective acquisition of all required learning outcomes.

PLEASE NOTE: *Any attempt at fraud, copying, plagiarism or other irregular behaviour constitutes a serious offence as set out in Title IV 'Academic Disciplinary Rules for Students' within the Rules of Conduct at the University of Navarra.*

OFFICE HOURS

Please contact by-email in order to arrange an interview

- **Dr. Inmaculada Pascual (ipascual@unav.es)**. Environmental Biology (*Biología Ambiental*, *Edificio Ciencias*) Office 5C01
- **Dr. Iker Zuriguel (iker@unav.es)**. Physics and Applied Mathematics (*Física y Matemática Aplicada, Edificio Castaños*)

BIBLIOGRAPHY AND RESOURCES

COMPLEMENTARY BIBLIOGRAPHY

- Pechenik, J.A. 1995. How to write about Biology. Harper Collins, London, UK.Find it in the Library
- **V.V. A.A. 2010. Excel 2010. Eni Ediciones. Barcelona.** Find it in the Library
- Rigolet, P. 2010. Excel 2010 Funciones Integradas. Eni Ediciones. Barcelona.Find it inthe Library
- **Microsoft Excel**
- **Edhlund BM and McDougall A. 2014. PubMed Essentials. Form and Kunskap AB. Stallarhomen, Sweden.** Find it in the Library

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- Web of Science (http://www.accesowok.fecyt.es/login/) and PubMed (http://www.ncbi.nlm.nih.gov/).
- PubMed guide: https://biblioguias.unav.edu/base-de-datos-PubMed
- **Virtual library resources (**http://www.unav.edu/web/biblioteca)