

Degree	Type	Year
Medicine	OB	6

Contact

Name: Jaime Kulisevsky Bojarski

Email: jaime.kulisevsky@uab.cat

Teachers

Carlos Rodrigo Gonzalo De Liria

Gianluigi Caltabiano

Oriol Gasch Blasi

Jesús Pérez Pérez

Angel Gonzalez Wong

Javier Pagonabarraga Mora

Oscar Manuel Len Abad

Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

It is advisable that the student has achieved basic skills in clinical pathophysiology and semiology, structural pathology, complementary exploration techniques, medical imaging, clinical and microbiological laboratory, as well as principles of pharmacology and therapeutics of the different human systems and systems.

Sufficient knowledge of pathophysiology on the psychological bases of health and disease states is desirable, as well as an adequate level of knowledge in interpersonal communication and English.

It is advisable that the student has achieved basic skills in the digital field, Molecular Biology, Genetics and Biostatistics. In addition, it is considered important to have an adequate level of knowledge in scientific communication, preferably in English, given that a large part of the sources of information and resources are available in this language. It will also be valued that students have a certain familiarity with basic data analysis tools and Biomedical databases.

Objectives and Contextualisation

Course Overview

This is a full-year course offered in the sixth year of the Medical Degree.

Like the other AIMS (Integrated Multidisciplinary Courses), it is a transversal subject designed to develop essential competencies for medical practice and scientific thinking. Its overall aim is to provide a comprehensive understanding of medical knowledge, integrating the biological and pathophysiological foundations of medicine with clinical disciplines as interconnected and continuous fields, rather than isolated subjects.

Throughout the course, students acquire transversal competencies such as evidence-based reasoning, the ability to formulate relevant clinical questions, analyze and interpret data, and apply pathophysiological principles to understand diseases. Generic skills such as teamwork, oral and written communication, critical information analysis, use of IT and bioinformatics tools, and self-directed learning are also emphasized.

Teaching is based on solving clinical problems, which change each academic year. Students work in small groups, guided by a lead tutor for each case and subject-specific tutors. The course follows a Problem-Based Learning (PBL) model, combining group tutorials with independent student work. At the beginning of each case, the objectives and structure of the task are explained. Students attend scheduled tutorials, search and study relevant information sources, and present their findings during the closing session of the case.

The Bioinformatics Module follows a blended teaching methodology. It includes an introduction to common bioinformatics tools, guided and autonomous problem solving, and a final group project presented as a scientific poster in a mock conference setting.

General Learning Objectives

- Acquire basic skills for medical practice.
- Understand the scientific foundations of clinical procedures.
- Develop abilities in the use of information resources and bioinformatics tools for biomedical research.
- Integrate knowledge gained in core subjects from previous academic years.
- Apply this knowledge to simulated clinical scenarios.
- Develop diagnostic and therapeutic decision-making skills.
- Foster autonomy, teamwork, and personal organization.
- Prepare and present scientific work clearly and rigorously, both orally and in writing.

Specific and Transversal Competencies

- Communicate clearly, both orally and in writing, with professionals and the general public.
- Understand the structure and function of the human body in health and disease across life stages and in both sexes, with a gender-sensitive perspective.
- Appreciate the limitations and value of scientific reasoning in the study, prevention, and treatment of diseases.
- Apply statistical methods and modern computational tools to biomedical analysis.
- Develop critical, creative, and research-oriented thinking in medical practice.
- Formulate hypotheses and critically gather and evaluate scientific data.
- Listen actively, and gather and synthesize relevant patient information.

- Establish effective, empathetic communication with patients, families, and healthcare professionals.
- Write clear and structured clinical documentation (e.g., medical records, reports).
- Use information technology and bioinformatics databases effectively.
- Recognize personal limitations and value input from other professionals.
- Recommend appropriate diagnostic and therapeutic techniques for prevalent conditions.
- Organize and manage personal professional activities responsibly.
- Uphold essential professional values: excellence, altruism, integrity, empathy, and scientific commitment.
- Identify and analyze the impact of gender and gender stereotypes on disease, communication, and therapeutic interaction, promoting equitable and gender-sensitive medical care.
- Practice medicine with awareness of the role as a steward of public resources and with ethical and legal responsibility.

BIOINFORMATICS

Objectives

1. General Objectives:

- Equip students with basic and advanced skills for the use of Bioinformatics tools, which are essential in current medical research and modern clinical practice.
- Promote a critical understanding of the application of Bioinformatics in disease diagnosis, prognosis, and treatment, as well as in the personalization of medicine through the use of genomic data and other digital biomedical resources.

1. Specific Objectives:

- Effectively use major Bioinformatics electronic resources that provide access to databases and tools for Biomedical, Genomic, and Proteomic research-such as NCBI, EMBL-EBI, and others-to obtain relevant information in the field of Medicine.
- Recognize the utility and potential of Bioinformatics information technologies in various areas of medical knowledge, such as Oncology, Genetics, and Pharmacogenomics, and apply them effectively to draw clinical conclusions.
- Interpret and analyze biological data using Bioinformatics tools and artificial intelligence for the analysis of omics data and the prediction of clinical phenotypes, highlighting practical applications.
- Develop the ability to integrate Bioinformatics knowledge into scientific research, thereby contributing to interdisciplinary projects that connect computational biology with clinical practice.

Competences

- Communicate clearly, orally and in writing, with other professionals and the media.
- Convey knowledge and techniques to professionals working in other fields.
- Critically assess and use clinical and biomedical information sources to obtain, organise, interpret and present information on science and health.
- Demonstrate basic research skills.

- Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
- Demonstrate understanding of basic statistical methodologies used in biomedical and clinical studies and use the analytic tools of modern computational technology.
- Demonstrate understanding of the importance and the limitations of scientific thought to the study, prevention and management of diseases.
- Demonstrate understanding of the manifestations of the illness in the structure and function of the human body.
- Demonstrate understanding of the structure and function of the human organism in illness, at different stages in life and in both sexes.
- Empathise and establish efficient interpersonal communication with patients, family-members, accompanying persons, doctors and other healthcare professionals.
- Engage in professional practice with respect for patients' autonomy, beliefs and culture, and for other healthcare professionals, showing an aptitude for teamwork.
- Establish a diagnostic approach and a well thought-out strategy for action, taking account of the results of the anamnesis and the physical examination, and the results of the appropriate complementary tests carried out subsequently.
- Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
- Indicate the basic diagnosis techniques and procedures and analyse and interpret the results so as to better pinpoint the nature of the problems.
- Indicate the most suitable treatment for the most prevalent acute and chronic processes, and for the terminally ill.
- Listen carefully, obtain and synthesise relevant information on patients' problems, and understand this information.
- Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
- Obtain and prepare a patient record that contains all important information and is structured and patient-centred, taking into account all age and gender groups and cultural, social and ethnic factors.
- Organise and plan time and workload in professional activity.
- Perform a general and a system-by-system physical examination appropriate to the patient's age and sex, in complete and systematic way, and a mental evaluation.
- Recognise the basic elements of the medical profession as the result of an evolving, scientific, social and cultural process, including ethical principles, legal responsibilities and patient-oriented professional practice.
- Recognise the professional values of excellence, altruism, sense of duty, compassion, empathy, honesty, integrity and commitment to scientific methods.
- Recognise, understand and apply the doctor's role as a manager of public resources.
- Recognize one's role in multi-professional teams, assuming leadership where appropriate, both for healthcare provision and for promoting health.
- Use information and communication technologies in professional practice.
- Write patient records and other medical documents that can be understood by third parties.

Learning Outcomes

1. Accept other viewpoints (lecturers, colleagues, etc.) regarding the problem or topic at hand.
2. Acquire the principles and values of good medical practice, both in health and in illness.
3. Adopt values of solidarity and service to others, both when dealing with patients and with the general public.
4. Apply analytic tests in accordance with their cost efficiency.
5. Appraise patients' expectations in order to respect them and act appropriately.
6. Assess the efficiency of the main therapeutic interventions.
7. Assess the importance of every sign and symptom in the current illness.
8. Assess the need, indications, contraindications, chronology, risk, benefits and costs of each examination.
9. Assess the relationship between efficacy and risk in the main therapeutic interventions.
10. Assess the semiological value of laboratory tests used in the most common human pathologies.
11. Be self-critical and reflect on one's own learning.
12. Calculate the cost efficiency of analytic tests.

13. Communicate clearly, orally and in writing, with other professionals and the media.
14. Compare one's own opinions with those of colleagues and other healthcare professionals as a basis for teamwork.
15. Conduct the interview correctly to obtain significant clinical data.
16. Convey knowledge and techniques to professionals working in other fields.
17. Correctly apply statistical techniques to obtain benchmark values and compare them to the results of analytic tests on patients.
18. Correctly record the information obtained in interviews with patients.
19. Critically assess the results of complementary examinations, taking their limitations into account.
20. Demonstrate basic research skills.
21. Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
22. Describe the elements that should be considered when determining the reasons for a consultation and those of the patient's therapeutic itinerary.
23. Describe the organisation, characteristics and performance of the Spanish health system.
24. Describe the person as a multidimensional being in which the interplay of biological, psychological, social, environmental and ethical factors determines and alters the states of health and disease and their manifestations.
25. Distinguish normality from pathological alterations on performing a physical examination.
26. Distinguish situations that require hospitalisation and those that require intensive care.
27. Establish a method for complementary examinations, in accordance with the standard process and the diagnostic expectations.
28. Establish a therapeutic action plan considering the needs of patients and their family and social environment, and involving all members of the healthcare team.
29. Explain ethical, legal and technical features and those of confidentiality related to patient documentation.
30. Explain the mechanisms by which illness affects the different systems of the human body at different stages in life and in both sexes.
31. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
32. Gather, choose and record important information patient supplied by patients and accompanying persons.
33. Gather meaningful psychosocial data.
34. Identify patients' social and health needs.
35. Identify serious clinical situations.
36. Identify sources of information on analytic tests for patients and professionals and critically evaluate their content.
37. Identify symptoms of anxiety, depression, psychosis, toxics consumption, delirium and cognitive deterioration.
38. Identify the basic principles of legislation on health and the right to health.
39. Identify the most efficient analytic tests for prevention, diagnosis and control of treatment for the most common human pathologies.
40. Identify the physical, chemical, environmental, psychological, social and occupational and carcinogenic factors, and the factors associated with food habits and drug use, that determine the development of the disease.
41. Identify type, evolution and limitations in chronic diseases, their possible treatments and prevention of complications.
42. Indicate and interpret the basic techniques and procedures for laboratory diagnosis, diagnostic imaging and others.
43. Indicate suitable therapeutic interventions for the main health problems.
44. Inform on the results of analytic tests.
45. Interpret population parameters of individual risks appropriately.
46. Involve the family in patient healthcare.
47. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
48. Obtain, in an appropriate way, clinical samples needed for laboratory tests.
49. Order signs and symptoms to perform a differential syndromic diagnosis.
50. Organise and plan time and workload in professional activity.
51. Summarise and order information on the problems of the sick.

52. Use appropriate statistical techniques to study the semiological value of analytic tests.
53. Use biomedical databases.
54. Use information and communication technologies in professional practice.

Content

Depending on the number of groups into which the students are divided, different clinical cases are prepared (at least one case per group) based on the subjects and materials of Module 3 (human clinical training), which will be solved by each group:

MIC IV (neurology, endocrinology, infectious diseases)

Pediatrics

Psychiatry

Clinical Dermatology

In solving the cases, some of the subjects from Module 4 and Module 2 are involved (when the case requires it):

Subjects of Module 4. Diagnostic and therapeutic procedures Medical Microbiology and Parasitology

Clinical Radiology Structural and Molecular Pathology General Pharmacology Clinical Pharmacology Medical Immunology

Subjects of Module 2.

Social Medicine, Communication Skills, and Introduction to Research Preventive Medicine and Public Health
Legal Medicine and Toxicology

Bioinformatics Module.

Practical sessions in Bioinformatics applied to Medicine

DISTRIBUTIVE BLOCKS

Presentation and solution of various clinical pathology cases, to be defined for each group

Bioinformatics Module:

The Bioinformatics module consists of 5 face-to-face sessions of 2 hours each, which combine theoretical classes and supervised practices, as well as autonomous activities. The teaching will be of a mixed type, with an initial introductory part to the most used tools, followed by the resolution of practical cases, both in a tutored and autonomous manner. At the end of the module, students will work in groups to prepare and present a complex clinical case, using the Bioinformatics tools studied.

Session 1 (2h) - Introduction to basic Bioinformatics tools and resources (ABP):

Students will be introduced to the most used tools and resources in Bioinformatics, including genomic databases (NCBI, EMBL-EBI) and genome browsers. Practical exercises will be carried out in the use of Genome Data Viewer, Ensembl and other platforms.

Session 2 (2h) - Genetic Variations and Mendelian Diseases (ABP):

Genetic variations and their relationship with Mendelian diseases will be studied, using databases such as dbSNP, ClinVar and OMIM. Case studies related to mutations and clinical variants will be analyzed.

Session 3 (2h) - Tutored Case Resolution (ABP):

AI-based clinical prediction tools will be introduced to support genetic diagnosis, trained to detect pathogenic variants. A clinical case will be presented that students will have to resolve using bioinformatics tools.

Session 4 (2h) - Group Resolution of a Selected Case (ABP):

Students, divided into groups, will work autonomously on the resolution of a selected clinical case. Each group will use the most appropriate Bioinformatics tools to reach diagnostic and therapeutic conclusions. This session will be guided by teachers, allowing students to apply the knowledge acquired in previous sessions.

Session 5 (2h) - Congress: Evaluated Oral Case Presentations (ABP):

The groups will present the results of their work to their peers and teachers, in a scientific congress format. Both the scientific quality of the work and the ability to communicate orally will be assessed.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
PROBLEM-BASED LEARNING (PBL)	25	1	1, 2, 17, 4, 3, 12, 13, 14, 21, 20, 22, 24, 23, 25, 26, 16, 28, 27, 29, 11, 31, 41, 40, 30, 38, 37, 36, 34, 39, 35, 46, 42, 43, 44, 45, 47, 48, 49, 50, 15, 33, 32, 18, 51, 53, 52, 54, 19, 10, 8, 9, 7, 6, 5
Type: Autonomous			
PERSONAL STUDY / READING ARTICLES / REPORTS OF INTEREST	94.25	3.77	

This guide describes the framework, content, methodology, and general rules of the course, in accordance with the current curriculum. The final organization of the course regarding clinical cases, group size and number, calendar distribution, exam dates, specific evaluation criteria, and exam reviews will be specified by each Hospital Teaching Unit (HTU), which will publish this information on their websites and on the first day of class through the faculty responsible for the course in each HTU.

For this academic year, the professors appointed by the Departments as course coordinators at the Faculty and HTU levels are:

Responsible Department(s): Multidepartmental

Faculty Coordinators: Jaume Kulisevsky (jkulisevsky@santpau.cat)

HTU Coordinators:

- HTU Vall d'Hebron: Oscar Len (oscarmanuel.len@vallhebron.cat)
- HTU Germans Trias i Pujol: Carlos Rodrigo Gonzalo de Liria (crodrigo.germanstrias@gencat.cat)
- HTU Sant Pau: Jaume Kulisevsky Bojarski (jkulisevsky@santpau.cat)
- HTU Parc Taulí: Oriol Gasch Blasi (ogasch@tauli.cat)
- Bioinformatics Module: Angel González Wong (Angel.Gonzalez@uab.cat)

TUTORS AND SESSIONS

Tutors: One case tutor for each subject involved in Module 3 clinical cases (assigned by each HTU). This tutor will be responsible for the case presentation, closing, and specific tutoring.

Module 3: Human Clinical Training:

- MIC IV (neurology, endocrinology, infectious diseases): number of cases to be defined
- Pediatrics: number of cases to be defined
- Psychiatry: number of cases to be defined
- Clinical Dermatology: number of cases to be defined

One reference tutor per subject for Modules 4 and 2, responsible for documentation, discussion, and case-specific tutoring.

Module 4. Diagnostic and Therapeutic Procedures:

- Medical Microbiology and Parasitology
- Clinical Radiology
- Structural and Molecular Pathology
- General and Clinical Pharmacology
- Medical Immunology

Module 2. Social Medicine, Communication Skills, and Research Initiation:

- Preventive Medicine and Public Health
- Legal Medicine and Toxicology

Sessions:

Total activity: 3 ECTS = 75 hours

- Autonomous activity (55%; 41.25h): Personal study, case and presentation preparation
- Guided activity: 40%; 30h (5 cases; one case = 6h in 4 sessions)
- Evaluation: 5%; 3.75h

Bioinformatics Module:

Total activity: 2 ECTS credits = 50 hours

Autonomous activity: 52%, 26 hours

Guided activity: 44%, 22 hours

Assessment: 4%, 2 hours

Session type:

Sessions 1 and 4 (ABP typology): 10h (5h+5h)

Sessions 2 and 3 (ABP typology): 20h (10h + 10h)

All students must know and participate in the resolution of all cases. Knowledge and participation will be the basis of the evaluation.

Time distribution (example):

Week 1: Presentation (5 x 1h = 5h)

Week 2: Documentation and problem solving (5 x 2h = 10h)

Week 3: Supervision and preparation of the presentation (5 x 2h = 10h)

Week 4: Presentation and closing of the case (5 x 1h = 5h)

Assessment

The assessment will be continuous and will be based on:

1. Attendance and active participation in the sessions (30%):

Attendance is mandatory in all sessions. Active participation in classes and the contribution of students to the resolution of the cases and exercises will be assessed.

2. Resolution of questionnaires and practical exercises (40%):

Questions will be given in each session that students must solve using the bioinformatics resources studied. These questionnaires will aim to consolidate the knowledge acquired and ensure its practical application.

3. Final presentation at the Congress (30%):

Students will present the results of the resolution of a clinical case in a group, using the most appropriate bioinformatics tools. The presentation will be in PowerPoint format and both scientific quality and presentation skills will be assessed.

Use of artificial intelligence tools: Students can use them to review or improve their texts, but not to generate work independently.

Note: 15 minutes of a class will be reserved to answer the teacher and subject evaluation surveys

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.

Assessment

Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assessments through practical cases and problem resolution (AIMV)	18% of the final mark	2	0.08	1, 2, 17, 4, 3, 12, 13, 14, 21, 20, 22, 24, 25, 26, 16, 28, 27, 11, 31, 40, 30, 37, 36, 34, 39, 35, 46, 42, 43, 44, 45, 47, 48, 49, 50, 15, 33, 32, 18, 51, 53, 52, 54, 19, 10, 8, 9, 7, 6, 5
Attendance and active participation (AIMV)	12% of the final mark	0	0	4, 14, 25, 26, 28, 11, 35, 48, 49, 15, 33, 53
Attendance and active participation (Bioinformatics)	12% of the final mark	0	0	4, 13, 14, 21, 11, 31
Congress / Presentation of works (Bioinformatics)	12% of the final mark	2	0.08	1, 2, 17, 13, 16, 11, 31, 40, 30, 45, 47, 51, 53, 54

Resolution of questionnaires (Bioinformatics)	16% of the final mark	0	0	21, 20, 31, 53, 54
Written evaluations through objectives tests (AIMV)	30% of the final mark	1.75	0.07	22, 24, 23, 28, 29, 11, 41, 40, 30, 38, 43, 49, 51, 19, 10, 9, 7, 6

Evaluation activities

Each student will participate in the presentation and resolution of a case. The main evaluation methodology of this subject is the continuous evaluation of the groups during the four sessions in which the subject is divided.

These seek that students, regardless of the specific content of each case, learn to integrate concepts, to ask and answer appropriately, to work in teams assuming what others in the same group are doing and getting used to correcting others, so that the end result is common and shared.

Presentation and discussion of the case

The presentation will be shared among all the students in the presentation group, on the scheduled day and in an equivalent presentation time. The case will be presented to the whole class (enrolment group), following a similar scheme and for a total approximate time of around 40 minutes

Continued evaluation

It is mandatory to attend the presentation sessions of all the cases and the final sessions in which the students present the resolution of each of the cases.

Attendance at the various meetings held with the tutor is mandatory. These can be done electronically (TEAMS).

Non-attendance prevents the student from being assessed. Participation in discussions and consulting tasks with other tutors will be valued

At the end, each group will have to prepare a document with the summary of the case, the differential diagnosis and the learnings they have had. These documents will be given to all students of the course.

As a guide, the final document must include the following points:

- Summary of the case
- Differential diagnosis
- Diagnostic hypothesis and plan to follow
- Complementary explorations
- Indicated diagnostic test and risk benefit
- diagnosis
- Treatment and prognosis

Non-attendance prevents the student from being assessed. Participation in discussions and consulting tasks with other tutors will be valued.

Bioinformatics Module

Assessment

Assessment will be continuous and based on:

1. Attendance and active participation in sessions (30%):

Attendance is mandatory in all sessions. Active participation in classes and student contributions to solving cases and exercises will be assessed.

2. Completion of questionnaires and practical exercises (40%):

Quizzes will be given in each session, which students will be required to complete using the bioinformatics resources studied. These questionnaires will aim to consolidate the knowledge acquired and ensure its practical application.

3. Final presentation at the Conference (30%):

Students will present the results of solving a clinical case in a group, using the most appropriate bioinformatics tools. The presentation will be delivered in PowerPoint format, and both scientific quality and presentation skills will be assessed.

Students who wish to obtain a First Class Honors will be required to take a multiple-choice test consisting of 3 to 5 questions for each of the cases worked on during the course by all groups, including 3 to 5 questions related to the Bioinformatics Module and the tools used. This test will be based on the documents prepared by each group. The highest grades will be eligible for a First Class Honors.

Students who do not pass the course through continuous assessment will be graded as "NOT EVALUABLE." The assessment, while following a similar pattern, may be adapted to the characteristics of each Hospital Teaching Unit. A make-up exam will be scheduled based on cases presented by students who have not passed the course content, in a format to be determined.

This course does not include a single assessment system.

Bibliography

Consult the specific bibliography of the teaching guides for the different fifth year subjects.

Bioinformatics Module

Bioinformatics

Recommended Bibliography

* Introduction to Bioinformatics / Teresa K. Attwood, David J. Parry-Smith; translation: Fernando González Candelas. Madrid: Prentice Hall, 2002.

* Translational Bioinformatics in Healthcare and Medicine. 1st Edition - May 13, 2021.

* Next generation sequencing and the future of genetic diagnosis. Neurotherapeutics. 11: 699-707. 2014.

* Topol, E. (2019). Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again. Basic Books.

* Diagnostic Clinical Genome and Exome Sequencing. New England Journal of Medicine. 370: 2418-2425. 2014

Programs

At the beginning of the module, the specific program needed to complete the practical activities will be provided to the virtual campus for the course, including access to databases and online resources.

Internet Resources

* National Institutes of Health (NIH)

- * National Center for Biotechnology Information (NCBI)
- * European Bioinformatics Institute (EMBL-EBI)
- * Online Mendelian Inheritance in Man (OMIM)
- * National Human Genome Research Institute
- * MedlinePlus in Spanish
- * Pharmacogenomics Knowledgebase (PharmGKB)
- * The Genetic and Rare Diseases (GARD) Information Center

Software

Specific software is not required for the part of clinical cases.

Bioinformatics Programs

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- * The Genetic and Rare Diseases (GARD) Information Center

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.