



SUBJECT OUTLINE

1. Programme of study description

1.1.	THE "CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY
1.2.	THE FACULTY OF MEDICINE / THE PRECLINICAL DEPARTMENT 3 – COMPLEMENTARY SCIENCES
1.3.	DISCIPLINE MEDICAL INFORMATICS AND BIOSTATISTICS
1.4.	DOMAIN OF STUDY: Healthcare – regulated sector within the EU
1.5.	CYCLE OF STUDIES: BACHELOR'S DEGREE
1.6.	PROGRAMME OF STUDY: MEDICINE

2. Subject description

2.1.	Name of the subject/compulsory subject/elective subject within the discipline: MEDICAL INFORMATICS AND BIOSTATISTICS						
2.2.	Location of the discipline: Faculty of General Medicine						
2.3.	Course tenured coordinator: Associate professor Luminița Iliuță, Associate professor Elena Poenaru, Lecturer Eugenia Panaiteescu, Lecturer Marius Rac-Albu						
2.4.	Practicals/clinical rotations tenured coordinator: Associate professor Elena Poenaru, Lecturer Eugenia Panaiteescu, Lecturer Marius Rac-Albu, Assistant Professor Emine Suliman, Assistant Professor Georgiana Camburu, Assistant Professor Mădălina-Elena Rac-Albu, Assistant Professor Petrescu Gheorghe-Dodu						
2.5. Year of study	II	2.6. Semester	III si IV	2.7. Type of assessment	Written and practical exam	2.8. Subject classification	Mandatory DS

3. Total estimated time (hours/semester of didactic activity) – teaching module

Number of hours per week	3	Out of which: course	1	Clinical rotation	2
Total number of hours from curriculum	42	Out of which: course	14	Clinical rotation	28
Distribution of allotted time					Hours
Study from textbooks, courses, bibliography, and student notes					6
Additional library study, study on specialized online platforms and field study					14
Preparing seminars / laboratories, assignments, reports, portfolios and essays					5
Tutoring					
Examinations					
Other activities					
Total hours of individual study					25
Number of credit points					3

4. Prerequisites (where applicable)

4.1. of curriculum	Basic computer skills
4.2. of competencies	Basic knowledge of PC operation, typing

5. Requirements (where applicable)

5.1. for delivering the course	Multimedia projector, negatoscope,
5.2. for delivering the clinical rotation	Computer network with dedicated server, licensed software - Windows, MS Office (full), SPSS



6. Acquired specific competencies

Professional competencies (expressed through knowledge and skills)	<p>At the end of the course the student must:</p> <ul style="list-style-type: none">- Know and understand the basic concepts, theories and methods of medical informatics and biostatistics and their appropriate use in medical activity and research- Know how to use the main software applications involved in basic scientific research methodology - spreadsheet applications, database management systems, statistical analysis applications- Use computer tools for bibliographic documentation - become familiar with techniques for searching, creating a bibliographic record, citing references for original articles, books/book chapters, web publication- Be familiar with the functions, principles and specifics of a medical database, create and design their own data tables, data entry forms, reports, etc.- Use the biostatistics concepts learned to present the first results of scientific research using Excel and SPSS programs for descriptive statistics calculations- to create a plan using the statistical and computer support learnt for the construction of a research project - formulate the research question, study the literature, define the variables, establish the target population and the study sample, present the first results of descriptive statistics, analyze the data according to the type of study, interpret and present the research results- Be familiar with and use the main computer tools in writing medical data and presenting research results: creating and formatting a presentation, presenting scientific information- Be familiar with the main IT tools used for designing their own website and for using a dedicated software application for a hospital or private practice and understand the principles of functioning of clinical and hospital IT systems for document and medical data flows as well as the concept of interoperability and its importance in healthcare- Understand the basic principles of computer processing of biological signals and medical imaging software applications, new trends in digital medicine and telemedicine
Transversal competencies (of role, of professional and personal development)	<ul style="list-style-type: none">- To be able to perform a research project under coordination, to solve a specific problem, with identification of the potential and limitations of the project; to correctly assess the workload, the required and available software resources, the time required for completion and the risks, under conditions of application of the accumulated knowledge of informatics and biostatistics and to perform with responsibility tasks specific to the role in a multidisciplinary team- To elaborate, draft and present the results of the



	<p>research project in the chosen field in Romanian and in an international language, using various sources and tools of information and presentation</p> <p>- Use information sources and communication and training resources (Internet portals, specialized software applications, databases, on-line courses, etc.) efficiently both in Romanian and in an international language</p>
--	---

7. Subject learning objectives (based on the scale of acquired specific competencies)

7.1. General learning objective	The discipline aims to introduce basic concepts and to develop a specialist culture in the field of medical informatics and biostatistics, specifically the use of informatics and biostatistics support for medical activity and research, to understand research results and the operating principles of clinical and hospital information systems for document and medical data flows as well as the concept of interoperability in healthcare.
7.2. Specific learning objectives	<ol style="list-style-type: none"> 1. To develop the knowledge and skills to create your own research protocol, using computer and statistical methods learned 2. The knowledge of the tools needed to understand and manage how statistical methods were created and chosen for specific articles, clinical trials or scientific papers, understanding the results of a study/article 3. To understand the concepts of interoperability in health, digitalization of medicine, telemedicine applications, medical imaging applications, computer processing of biological signals

8. Content

8.1. Course	Teaching methods	Observations
Course 1 Computerized documentation. Search browsers. Database management systems in medicine.	<p>Master course</p> <p>Interactive presentation of the material according to the curriculum, using multimedia / overhead projector, PowerPoint presentations, teaching films</p> <p>- For all courses there is up-to-date electronic support as PowerPoint presentations posted on the university website</p> <p>- Library and laboratories with computer network and specific software applications are available at the discipline</p>	2
Course 2 Dedicated IT systems for hospital and private practice. Standards and ways to achieve interoperability in medical data. Electronic health record. Security of health data transfer. Confidentiality of medical data. GDPR.		2
Course 3 New trends in the digitization of medicine - digital cardiology. Telemedicine applications. Biological signal processing, notions of medical imaging.		2
Course 4 Data types, frequencies, distributions, sampling. Elements of descriptive statistics.		2
Course 5 Estimation and statistical significance tests. Inference about means.		2
Course 6 Qualitative data analysis. Correlation and regression analysis		2
Course 7 Elements of biostatistics and informatics required for the development of a research report and a scientific article		2



8.2. Clinical rotation	Teaching methods	Observations
CR 1 Familiarization with the laboratory and computer network. Control of search browsers and Word application; Writing your own CV (Europass format), formatting columns, creating tables. Computerized documentation in the medical field - use of browsers to create bibliographical references; advanced search (keywords, combinations, etc.). Creation of Web pages	Practical and theoretical computer-assisted applications, use of multimedia, teaching films, case studies, databases, specific applications, abstracts of articles, reports, literature reviews, debates, micro-group work, individual study. Projects are developed in micro-groups.	2
CR 2 Identify the usual statistical indicators using Excel. Simple functions, frequencies, medians and quartiles in Excel. Creating charts, types of charts used in medicine.		2
CR 3 Functions in Excel (COUNTIF, CONCATENATE, AVERAGE, STDEV, VLOOKUP...). Column charts. Pareto charts (e.g. hierarchisation of causes of death). Calculation of weighted mean. Evolution and comparison diagrams.		2
CR 4 Median and center estimation. Calculation of confidence intervals in Excel. Detailed chart control in Excel. Radial structures.		2
CR 5 Introduction to SPSS. Opening Excel files and exploring data with SPSS.		2
CR 6 Comparison of means using SPSS.		2
CR 7 Contingency tables in Excel. Hi-square test in Excel and SPSS.		2
CR 8 Correlation coefficients in Excel. Trend lines in Excel. Linear regression with Excel and SPSS.		2
CR 9 Creating data tables with MsAccess. Transferring data between Excel and Access. Sorting records and database queries. Entering and reporting results using database applications. Multiple linear regression with Excel and SPSS.		2
CR 10 Query by filters in Access. Input forms. Viewing and linking tables. Reporting layouts.		2
CR 11 Writing an article. Pagination, publishing on the Internet, formatting by columns, inserting and creating tables, graphs, captions, abbreviations. Creating bibliographic references with automatic links, automatic headers.		2
CR 12 Presentation of research results with PowerPoint application		2



CR 13 EKG signal analysis. Interoperability - integrating various types of data from different sources into a dedicated software application for a private clinic	2
CR 14 Drafting a clinical/paraclinical research report following the learned steps	2

Bibliography for course and clinical rotation

1. Piotr Bilski, Francesca Guerriero - Computer Systems for Healthcare and Medicine, River Publishers Series in Information Science and Technology, 2017 - acces gratuit (Kindle free e-books) prin Kindle App sau Kindle Cloud Reader
2. Tyler S - Introduction to Biostatistics: A step by step guide, Kindle Edition 2016 – acces gratuit (Kindle free e-books) prin Kindle App sau Kindle Cloud Reader
3. Stephan P. Kudyba - Healthcare Informatics: Improving Efficiency through Technology, Analytics, and Management , Ed Springer aprilie 2016, ISBN-13: 978-1498746359
4. Tim Benson, Grahame Grieve - Principles of Health Interoperability: SNOMED CT, HL7 and FHIR (Health Information Technology Standards) 3rd ed. Ed Springer 2016, ISBN-13: 978-3319303680
5. Usman Zafar Paracha, Basic Biostatistics with Basic Steps in SPSS® Kindle Edition 2016 –acces gratuit (Kindle free e-books) prin Kindle App sau Kindle Cloud Reader
6. Julien I. E. Hoffman - Biostatistics for Medical and Biomedical Practitioners 1st Edition , Ed. Springer 2016, ISBN-13: 978-0128023877
7. Bernard Rosner, Fundamentals of Biostatistics 8th Edition , Ed. Springer 2016, ISBN-13: 978-1305268920
8. Prasanth K - Guide To Research Methodology And Biostatistics, Ed Springer 2017, ISBN-13: 978-9386310644, ASIN: B06XFXLRFB
9. Pooja Tiwari, Pallavi Pandey - A Practical Guide for Basic Bioinformatics and Biostatistics Paperback – Notion Press, Inc, martie 2017, ISBN-13: 978-1946822260
10. Faye Anderson, Biostatistics by Example: Hands on approach using R Paperback – CreateSpace Independent Publishing Platform, January 29, 2017, ISBN-13: 978-1542838177
11. Poduri S.R.S. Rao - Statistical Methodologies with Medical Applications 1st Edition , Ed Springer 2016, ISBN-13: 978-1119258490
12. Lehne, M., Sass, J., Essenwanger, A. et al. Why digital medicine depends on interoperability. npj Digit. Med. 2, 79 (2019). <https://doi.org/10.1038/s41746-019-0158-1>
13. Pagano, M., Gauvreau, K., & Mattie, H. (2022). Principles of Biostatistics (3rd ed.). Chapman and Hall/CRC. <https://doi.org/10.1201/9780429340512>
14. Gogia, Shashi Bhushan, ed. Fundamentals of telemedicine and telehealth. Academic Press, 2019., Paperback ISBN: 9780128143094, eBook ISBN: 9780128143100
15. Pentti Nieminen (Ed.) - Medical Informatics and Data Analysis, March 2021, ISBN 978-3-0365-0098-0 (Hbk); ISBN 978-3-0365-0099-7 (PDF), <https://doi.org/10.3390/books978-3-0365-0099-7>

9. Corroboration of the subject content with the expectations of the representatives of the epistemic community, professional associations, and major employers in the field of the programme of study

The student of the second year in the discipline of Medical Informatics and Biostatistics is familiar with the use of informatics and biostatistical support for medical activity and research and for understanding research results. Thus, the student's training focuses on specific software applications and biostatistical concepts, which is essential for strengthening knowledge and skills for the development of their own research and for understanding various published studies.

Also, for the proper management of the clinical case and for ensuring the continuity of the medical act, the student's training intends to understand the role and functions of the concept of interoperability in the healthcare domain as well as the new trends in digital medicine and telemedicine, so that the future doctor will know how to correctly use a specific software application at different levels of healthcare



The "Carol Davila" University of Medicine and Pharmacy Bucharest
The Quality Assurance Commission

and in multidisciplinary teams.

The curriculum of the discipline is in accordance with the requirements of the professional association and employers

10. Assessment

Type of activity	Assessment criteria	Assessment methods	Assessment weighting within the final grade
Course	- proper assimilation and correct understanding of the concepts presented	Written exam , containing 20 theoretical questions - grid test The student receives a final mark of 5 - if he/she solves between 60 - 65% of the quiz and 10 if he/she solves more than 90% of the quiz	60%
Clinical rotation	- correctly solving the applications in the practical work, using the methods presented and the knowledge acquired	Periodic assessment of the quality of the student's work - knowledge for grade 10 (20% of the final grade): minimum 80% of the topics proposed in the laboratory activity	10%
	-correctly solving two proposed practical topics, using the methods presented and the knowledge acquired during the practical work	Practical exam: Final evaluation of the knowledge acquired by the student in the laboratory activity by solving two proposed topics.	20%
	- implementation of a micro-group research study of the students' choice, using appropriate methodology and techniques - analysis of data collected using appropriate methods - presentation of the results in accordance with the defined objectives and using correct graphical techniques	Project: topic of the student's choice, completed by a report with citations, in the form of an article publishable in scientific journals and oral presentation of the results as a PowerPoint presentation.	10%

Minimum performance standard

- Solving the proposed laboratory assignments - marked passed or failed, eliminatory test
- Minimum acceptance criteria for the micro-group project - pass or fail, eliminatory test
- Correctly solving the practical test - marked passed or failed, eliminatory test.
- Correctly pass at least 60% of the written examination.

Date of filing

Signature of the course tenured coordinator

Signature of the seminar tenured coordinator

Date of approval in the Council of the Department:

Signature of the Head of the Department