



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.	Cod of the discipline: DCII7S3M				
2.3.	Type of the discipline (DF/DS/DC): DC				
2.4.	The status of the discipline (DOB/DOP/DFA): DOB				
2.5.	Course coordinator: Associate Professor Dr. Elena Poenaru				
2.6.	Practicals activities coordinator: Associate Professor Dr. Elena Poenaru, Lecturer Dr. Madalina Rac-Albu, Assistant Prof. Dr. Emine Suliman, Assistant Prof. Dr. Georgiana Camburu, Assistant Prof. Dr. Dodu Petrescu				
2.7. Year of study	II	2.8. Semester	I	2.9. Type of assessment (E/C)	Written exam

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

I. University preparation (teaching, practical application, assessment)						
3.1. Number of hours per week	2	Of which:	3.2. course	1	3.3. seminar/ laboratory	2
3.4. Total number of hours from curriculum	42	Of which:	3.5. course	14	3.6. seminar/ laboratory	28
Examinations (number of hours):						
II. Preparation/individual study						
Distribution of time						hours
Study of course materials, textbooks, books, study of the minimum recommended bibliography						14
Additional documentation in the library, documentation via the Internet						12
Carrying out specific preparation activities for the project, laboratory, writing assignments, reports						10
Preparation for presentations or checks, preparation for the final examination						16
Tutoring						6
Other activities						-



3.7. Total hours of individual study	58
3.9. Total hours per semester (3.4.+ 3.7.)	100
3.10. Number of credits	4

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	Internet access, PC/laptop, projector
5.2. for delivering the clinical rotation	Internet access, Laboratory infrastructure - PC/laptop, computational resources.

6. Learning outcomes*

Knowledge	Skills	Responsibility and autonomy
At the end of the course, the student will know and understand: • the basic concepts, theories and methods of informatics and how they can be used in the medical field as well as in medical research • software applications used in informatics; • the structure of databases, their access, storage and security possibilities;	At the end of the course, the student will be able to: • use specific analysis methods and techniques in informatics and biostatistics • the importance of ensuring the interoperability of medical data, the aspects of operating these types of databases; • how the concepts presented can be integrated in clinical activities.	During the course the student will acquire the following abilities: • how to carry out a research project, with a specific purpose, starting from the identification of the potential and the resources needed for the project, making a correct assessment of the workload, the time required for completion, the risks, applying the informatics knowledge accumulated in the projects interdisciplinary;

7. Subject learning objectives (based on the learning outcomes)

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	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.	Master course Interactive presentation of the material according to the curriculum, using multimedia / overhead projector, PowerPoint presentations, teaching films - For all courses there is up-to-date electronic support as PowerPoint presentations posted on the university website - Library and laboratories with computer network and specific software applications are available at the discipline	2 hours
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 hours
Course 3 New trends in the digitization of medicine - digital cardiology. Telemedicine applications. Biological signal processing, notions of medical imaging.		2 hours
Course 4 Data types, frequencies, distributions, sampling. Elements of descriptive statistics.		2 hours
Course 5 Estimation and statistical significance tests. Inference about means.		2 hours
Course 6 Qualitative data analysis. Correlation and regression analysis		2 hours
Course 7 Elements of biostatistics and informatics required for the development of a research report and a scientific article		2 hours

8.2. Practical Classes	Teaching methods	Observations
CR 1 Familiarization with the laboratory and computer network. Control of search browsers and Word application, formatting columns, creating tables. Computerized documentation in the medical field - use of browsers to create bibliographical references; advanced search (keywords, combinations, etc.).	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 hours
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 hours
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 hours
CR 4 Median and center estimation. Calculation of confidence intervals in		2 hours



Excel. Detailed chart control in Excel. Radial structures.	
CR 5 Introduction to SPSS. Opening Excel files and exploring data with SPSS.	2 hours
CR 6 Comparison of means using SPSS.	2 hours
CR 7 Contingency tables in Excel. Hi-square test in Excel and SPSS.	2 hours
CR 8 Correlation coefficients in Excel. Trend lines in Excel. Linear regression with Excel and SPSS.	2 hours
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 hours
CR 10 Query by filters in Access. Input forms. Viewing and linking tables. Reporting layouts.	2 hours
CR 11 Writing an article, inserting and creating tables, graphs, captions, abbreviations. Creating bibliographic references with automatic links, automatic headers.	2 hours
CR 12 Presentation of research results with PowerPoint application	2 hours
CR 13 Interoperability - integrating various types of data from different sources into a dedicated software application for a private clinic	2 hours
CR 14 Drafting a clinical/paraclinical research report following the learned steps	2 hours

Bibliography for Course and Practical Classes

1. Medical Informatics and Data Analysis, Pentti Nieminen (Ed.) , 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>
2. AppGenEdu - An Integrated Approach for the Bioinformatics Training, Elena Poenaru, Andrei Manolescu et al, Editura Curtea Veche Publishing House, 2021, ISBN 978-606-792-045-1.
3. Biostatistics by Example: Hands on approach using R Paperback; Faye Anderson, CreateSpace Independent Publishing Platform, 2017, ISBN-13: 978-1542838177
4. Healthcare Informatics: Improving Efficiency through Technology, Analytics, and Management, Stephan P. Kudyba, Ed Springer aprilie 2016, ISBN-13: 978-1498746359
5. Clinical Biostatistics, by Martin Bland, University of York
6. Statistical reasoning for Public Health, John McGrady, Johns Hopkins Bloomberg School of Public Health
7. Introduction to Medical Statistics, John Chen, Stony Brook University School of Medicine
8. Statistical Methodologies with Medical Applications 1st Edition, Poduri S.R.S. Rao - Ed Springer 2016, ISBN-13: 978-1119258490



9. Fundamentals of Biostatistics, Bernard Rosner, 8th Edition , Ed. Springer 2016, ISBN-13: 978-1305268920
10. Computer Systems for Healthcare and Medicine, Piotr Bilski, Francesca Guerriero - River Publishers Series in Information Science and Technology, 2017

9. Assessment

Type of activity	9.1. Assessment criteria	9.2. Assessment methods	9.3. Assessment weighting within the final grade
9.4. Course	Knowing and understanding the fundamental theoretical notions of medical informatics and biostatistics.	Written exam, consisting of a multiple choice test with 25 questions. The final grade will be 5 if at least 10 questions are solved correctly and 10 if more than 18 questions are solved.	60%
9.5. Practical Classes	Contributes to discussions by asking relevant questions or sharing insights. Demonstrates preparation (e.g., has read assigned papers, understood seminar topic).	Oral exam, case-based mini-assignments: students analyze a dataset snippet, or pipeline and write a short critique Group discussion evaluation: assess how well students propose alternative methods or critically evaluate presented results.	40%
9.6. Minimum performance standard			
• Participation in at least 80% of Practical Classes and Lecturers; • Delivery of a report on a Bioinformatics topic; • Correct answer to at least 10 questions in the theory test.			

Date of filing

Signature of the course coordinator

Signature of the seminar coordinator

Date of approval in the
Council of the Department:

Signature of the Head of the
Department