



Clinical Informatics and Biostatistics

1. IMPRINT	
Academic Year	2024/2025
Department	Faculty of Medicine and Dentistry
Field of study	English Dentistry Division
Main scientific discipline	Medical science
Study Profile	General academic
Level of studies	Uniform MSc
Form of studies	Full time studies
Type of module / course	Obligatory
Form of verification of learning outcomes	Completion
Educational Unit	Department of Medical Informatics and Telemedicine 00-581 Warszawa, Litewska 14/16 phone (+48) 22 116 92 44 e-mail: zimt@wum.edu.pl
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2. BASIC INFORMATION			
Year and semester of studies	2nd year, 4th semester	Number of ECTS credits	2.00
FORMS OF CLASSES		Number of hours	ECTS credits calculation
Contacting hours with academic teacher			
Lecture (L)		4 (4 via e-learning)	0.16
Seminar (S)			
Classes (C)		21	0.84
e-learning (e-L)			
Practical classes (PC)			
Work placement (WP)			
Unassisted student's work			
Preparation for classes and completions		25	1.00

3. COURSE OBJECTIVES	
O1	During the course, the student learns the basics of biostatistics, databases, including bibliography, applications enabling scientific research and sample programmes useful in professional practice.
O2	The aim of the classes is also to present basic information on new specialisations and medical faculties: telemedicine, medical and clinical computer science, e-Health, mHealth and virtual reality.
O3	Student will develop practical skills in data processing and analysis.

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING	
Code and number of effect of learning in accordance with standards of learning	Effects in the field of:
Knowledge – Graduate* knows and understands:	
B.W9.	methods of tissue and organ imaging and the principles of operation of diagnostic equipment for this purpose
D.W17.	process of developing new specialisations in the field of the academic discipline – medical sciences and achievements of leading representatives of Polish and world medicine

Skills– Graduate* is able to:	
D.U13	use and process information using IT tools and modern sources of medical knowledge
D.U16.	critically analyse medical literature, including in English, and draw conclusion.

* In appendix to the Regulation of Minister of Science and Higher education from 29th of September 2023 „graduate”, not student is mentioned.

5. ADDITIONAL EFFECTS OF LEARNING (non-compulsory)

Number of effect of learning	Effects in the fields of:
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Knowledge – Graduate knows and understands:

K1	the potential of modern telemedicine as a tool supporting physician work
K2	principles of personal data protection
K3	essential IT and biostatistical tools used in medicine, including medical databases, spreadsheets and basics of computer graphics

Skills– Graduate is able to:

S1	use databases, including online databases, explore and process data using available tools
S2	select an adequate statistical test, conduct basic statistical analyses, use relevant methods to present the results, and interpret the results of the meta-analysis

Social Competencies – Graduate is ready for:

SC1	keeping medical privilege and patients' rights
SC2	the use of objective data sources

6. CLASSES

Form of class	Class contents	Effects of Learning
Lectures	The module: Clinical Informatics and Telemedicine L1. – Lecture 1 – Telemedicine - legal and practical background. Asynchronous e-learning, eWUM platform, specified weeks	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	L2. – Lecture 2 – Electronic Health Records. Rules of entering and storing data. Providing access to medical records and personal data protection. Asynchronous e-learning, eWUM platform, specified weeks	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, SC1, SC2
Classes	C1. – Class 1 – Medical Internet. Online bibliographic databases - medical information research and methodology for evaluating the reliability of information. Evidence-based medicine.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	C2. – Class 2 – Medical imaging - DICOM characteristics. Software for analysing and processing medical images. Fundamentals of image processing - discussion of basic formats, compression methods and their properties. Image data in medicine – examples.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, SC1, SC2

	C3. – Class 3 – mHealth, eHealth. New medical technologies. Telemedicine as a solution of health care problems. Examples of practical implementations. Virtual Patient. Examples of systems and applications for medical simulation and BLS learning.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, SC1, SC2
Lectures	Module Biostatistics in Clinical Practice. L3. – Lecture 3 – Introduction to biostatistics. Research methodology - statistical methods. Planning a scientific research - an algorithm of investigation. Basic terms and statistical measurements. Asynchronous e-learning, eWUM platform, specified weeks	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	L4. – Lecture 4 – Introduction to biostatistics. Review of chosen statistical tests - selection of test according to the type of variables. Descriptive analysis and statistical inference. Interpretation of statistical analysis results. Selected techniques of statistical analysis. Asynchronous e-learning, eWUM platform, specified weeks	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
Classes	C4. – Class 4 – Database design. Preparation and processing of data for statistical calculations. Data readability. Usage of a spreadsheet as a simple medical database, overview of program functions.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	C5. – Class 5 – Descriptive statistics. Distribution of a variable. Practical exercises on the selected samples. Introduction to the software for statistical analysis planning and data visualisation.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	C6. – Class 6 – Statistical analysis software - practical classes. Hypothesis testing. Use of parametric and non-parametric tests. Exercises on sample clinical data.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2
	C7. – Class 7 – Statistical analysis software - practical classes. Regression analysis. Exercises on sample clinical data. Overview of selected publications. E-test (MCQ) – questions on the material of lectures and classes. The electronic test is conducted during the last class.	B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2

7. LITERATURE

Obligatory

1. Lectures and educational materials prepared on WUM e-learning Platform.

Supplementary

1. Clinical Informatics Study Guide Text and Review. John T. Finnell, Editor, Brian E. Dixon, Editor, Springer 2016.
2. Fundamentals of Clinical Trials, 4e, Lawrence M. Friedman, Curt D. Furberg, David L. DeMets, Springer 2010
3. Digital Imaging and Communications in Medicine (DICOM), Oleg S. Pianykh, Springer 2012
4. Epidemiology and Biostatistics, Bryan Kestenbaum, Springer 2009

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion
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B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2	Lecture completion: completion of e-learning activities by the specified deadline.	To pass the e-modules - obtaining at least 51% of the points.
B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2	Completion of classes with teacher: activity, fulfilment of exercises.	Monitoring of the exercises by the teacher. The assistant gives a final evaluation of all the classes.
B.W9., D.W17., D.U13, D.U16., K1, K2, K3, S1, S2, SC1, SC2	Course completion: e-test: lectures and classes material, 50 questions, open questions and MSQ.	Grade ranges for the electronic test: 2.0 (failed) up to 51% of points 3.0 (acceptable) 51.1%-60% points 3.5 (acceptable plus) 60.1%-70% of points 4.0 (good) 70.1%-80% of points 4.5 (good plus) 80.1%-90% of points 5.0 (very good) above 90% of points The final course grade is the average of the class grades and the final test.

9. ADDITIONAL INFORMATION

The subject is divided into two modules: Clinical Informatics and Telemedicine & Biostatistics in Clinical Practice. The learning contents are taught in the form of blended learning in lectures, seminars and practical - exercises with an assistant using a computer or a tablet. Clinical data collected in the Department during statistical analyses and examples of medical images are used in the course. Materials, systems and applications were developed in the WUM AID and Time2MUW projects.

Course begins with classes conducted by assistants at the Department of Medical Informatics and Telemedicine (Litewska 16, 3rd floor). Dates of lectures and classes for particular groups are given in the timetable and the course schedule in the eWUM Platform. During the first class, students will receive detailed information on the e-course.

To access the eWUM Platform (e-learning.wum.edu.pl/en), students log in as for the SSL-WUM service:

Please enter your ID (s0+ album number): s0XXXXX and enter the same password used for the SSL-WUM service.

We kindly ask each student to check before class if they can log in to the eWUM Platform. In case of any problems, please get in touch with the WUM IT Department (it.wum.edu.pl).

The electronic test is conducted during the last class at the Department. It is possible to take two attempts at the final test. The second attempt date should be agreed with the course tutor in the given group.

Course Regulations:

- 1) Classes conducted by the Department of Medical Informatics and Telemedicine in the first or second semester of study have the form of lectures, seminars and exercises. All classes are obligatory, except for optional classes.
- 2) The course shall be completed following the scheme in the syllabus.
- 3) A student assigned to a study group does classes with that group within the course, which means it is impossible to change the group during a semester or between semesters.
- 4) Students are entitled to one excused or unexcused absence per class cycle. A larger number of absences results in failing to pass the course.
- 5) If a student cannot attend classes, he/she should send an e-mail to zimt@wum.edu.pl requesting to excuse for the absence. A student is obliged to send the request at least 24 hours before the start of classes or no later than three [3] days after the date on which the circumstances causing absence in classes occurred. Failure to send the application within the specified time limit results in the considering absence as unexcused.
- 6) A doctor's or dean's certificate justifying an absence is delivered by the student to the Department's Office during the subsequent full-time classes, but no later than within seven [7] working days of the certificate's issuance.

- 7) Exercises and seminars missed regardless of the reason (excused and unexcused) should be made up on time and in the form specified by the teaching supervisor.
- 8) Late for classes exceeding 15 minutes is treated as an absence.
- 9) Applications for re-grades and credits are accepted during the first two weeks of the semester. Applications should include the course syllabus in which the credit or grade is to be transcribed.
- 10) Any issues not covered in the above regulations are decided by the teaching supervisor in consultation with the head of the unit.

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ATTENTION

The final 10 minutes of the last class of the block/semester/year should be allotted for students to fill out the Survey of Evaluation of Classes and Academic Teachers