



Clinical Informatics and Biostatistics

1. IMPRINT

Academic Year	2026/2027
Department	Faculty of Dental Medicine
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.W8.	methods of tissue and organ imaging and the principles of operation of diagnostic equipment for this purpose
B.W23.	basic computer and biostatistical tools used in medicine, including medical databases, spreadsheets, and the basics of computer graphics
B.W24.	basic methods of statistical analysis used in population-based and diagnostic studies
D.W16.	the process of formation of new specialties within the discipline of medical sciences and achievements of leading representatives of both Polish and worldwide medicine and dentistry
Skills– Graduate* is able to:	

B.U10.	use databases, including the Internet, and search for the information needed using the tools available
B.U11.	critically analyse medical literature, including in English, and draw conclusions
B.U12.	select an appropriate statistical test, carry out basic statistical analyses, use appropriate methods to present results and interpret the results of meta-analysis

* 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

Skills– Graduate is able to:

S1	use methods for evaluating an individual's health status and various classification systems of diseases and medical procedures
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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.W8., B.W23., B.W24., D.W16., B.U10, B.U11, B.U12., K1, K2, S1, SC1, SC2
	L2. – Lecture 2 – Electronic Health Records. Cybersecurity for professionals. Asynchronous e-learning, eWUM platform, specified weeks	B.W8., B.W23., B.W24., D.W16., B.U10, B.U11, K1, K2, 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.W8., B.W23., D.W16., B.U10, B.U11, K1, K2, S1, 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.W8., B.W23., D.W16., B.U10, B.U11, K1, K2, S1, SC1, SC2
	C3. – Class 3 – mHealth, eHealth. New medical technologies. Telemedicine as a healthcare problem-solving tool: examples of practical solutions. Virtual Patient. Examples of systems and applications for medical simulation and BLS learning.	B.W8., B.W23., D.W16., B.U10, B.U11, K1, K2, S1, SC1, SC2
	C4. – Class 4 – The practical use of AI and Large Language Models for students and medical professionals. ChatGPT: practical applications and limitations in daily work. Rules for building queries: Outline and	B.W8., B.W23., D.W16., B.U10, B.U11, K1, K2, S1, SC1, SC2

	present results. ChatGPT as an assistant in information retrieval and data analysis	
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.W23., B.W24., B.U10, B.U11, B.U12., K2, S1, SC1, SC2
	L4. — Lecture 4 – Introduction to biostatistics. Review of chosen statistical tests - selection of tests 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.W23., B.W24., B.U10, B.U11, B.U12., K2, S1, SC1, SC2
Classes	C5. – Class 5 – Database design. Descriptive statistics. Preparation and processing of data for statistical calculations. Data readability. Usage of a spreadsheet as a simple medical database, and an overview of program functions. Distribution of a variable. Practical exercises on the selected samples.	B.W23., B.W24., B.U10, B.U11, B.U12., K2, S1, SC1, SC2
	C6. – Class 6 – Statistical analysis software - practical classes. Hypothesis testing. Use of parametric and non-parametric tests. Exercises on sample clinical data. 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
	C7. – Class 7 – Statistical analysis software - practical classes. Regression analysis. Exercises on sample clinical data. E-test (MCQ) – questions on the material of lectures and classes. The electronic test is conducted during the last class.	B.W8., B.W23., B.W24., D.W16., B.U10, B.U11, K1, K2, S1, 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
B.W8., B.W23., B.W24., D.W16., B.U10, B.U11, K1, K2, S1, 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.W8., B.W23., B.W24., D.W16., B.U10, B.U11, K1, K2,	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.

S1, SC1, SC2		
B.W8., B.W23., B.W24., D.W16., B.U10, B.U11, K1, K2, S1, SC1, SC2	Course completion: e-test: lectures and classes material, 50 questions, open questions and MSQ.	Grade ranges for the electronic test: 2.0 (ndst) up to 51% of points 3.0 (dst) 51.1%-60% points 3.5 (ddb) 60.1%-70% of points 4.0 (db) 70.1%-80% of points 4.5 (pdb) 80.1%-90% of points 5.0 (bdb) 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 content is delivered through blended learning, with lectures, seminars, and practical exercises, all conducted by the tutor using a computer or tablet. Clinical data collected in the Department, while conducting statistical analyses, and examples of medical images are used in the course. Materials, systems and applications were developed in the Time2MUW project.

The course begins with classes at the Department of Medical Informatics and Telemedicine (Litewska 16, 3rd floor). Dates of lectures and classes for specific groups are provided in the timetable and course schedule on 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 contact 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 electronic final test. The second attempt date should be agreed with the course tutor in the given group. The third retake term will be an oral assessment, and the material covered will include all content presented in lectures and classes.

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 course cycle. A greater number of absences will result in failing the course. Exercises and seminars missed for any reason (excused or unexcused) must be made up/passed within the time limit and in the form specified by the teaching tutor.
- 5) If a student cannot attend classes, they should send an email to zimt@wum.edu.pl requesting an 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 absence being considered 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) Being late for classes exceeding 15 minutes is treated as an absence.
- 8) Applications for re-grades and credits are accepted during the first two weeks of the semester. Applications must be supplemented with the syllabus for the course, from which the credit or grade is supposed to be transferred.
- 9) Any issues not covered in the above regulations are decided by the teaching supervisor in consultation with the head of the unit.

Forms of making up classes: After consulting with the teaching tutor, classes should be made up with another student group. Those unable to make up their attendance with another group will participate in designated workshops, which must be completed within the specified deadline.

At the Department there is a Students' Club MedIT which associates students willing to improve their knowledge about medical informatics, artificial intelligence and using advanced computer methods in medicine. If you are interested, please contact the tutor: Jakub Rokicki (jakub.rokicki@wum.edu.pl).

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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