



SUBJECT OUTLINE

1. Programme details

1.	"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY
1.2.	FACULTY OF MEDICINE
1.3.	DEPARTMENT 3 PRECLINICAL (COMPLEMENTARY SCIENCES)
1.4.	DISCIPLINE Marketing and Medical Technology (ENGLISH)
1.5.	FIELD OF STUDY: HEALTH
1.	STUDY YEAR: BACHELOR DEGREE
1.7	STUDY PROGRAM: MEDICINE

2. Information about the subject

2.1	Name of the subject: Medical devices and equipment				
2.2	Subject code: DO II 13 S4M				
2.3	Type of course (DF/DS/DC): DC				
2.4	Subject code (DOB/DOP/DFA): DOP				
2.5	Course tenured coordinator: Iuliana Raluca Gheorghe, senior lecturer				
2.6.	Practical lesson tenured coordinators: Soare Traian, assistant professor Ioachim Marinela, assistant professor Nistor Raluca, assistant professor				
2.7. Year of study	2	2.8. Semester	II	2.9. Type of assessment (E/C)	C

3. Total estimated time (hours/semester of teaching and preparation/individual study)

I. University preparation (teaching, practical application, assessment)						
3.1. Number of hours per week	4	of which:	3.2. course	2	3.3. practical lesson	2
3.4. Total hours in the curriculum	28	of which:	3.5. course	14	3.6. practical lesson	14
Assessment (number of hours): 28						
II. Preparation/individual study						
Time allocation						hours
Study of course materials, textbooks, books, study of the minimum recommended bibliography						10
Additional research in the library, research via the internet						4
Preparing specific activities for the project, practical work, assignments, reports						6
Preparation for presentations or tests, preparation for final examination						10
Consultations						2
Other activities						-
3.7. Total hours of individual study						32

3.9. Total hours per semester (3.4.+ 3.7.)	60
3.10. Number of credits	2

4. Prerequisites (where applicable)

4.1. of curriculum	Not applicable
4.2. of competencies	Not applicable

5. Requirements (where applicable)

5.1. for teaching the course	• Computer equipment and software for multimedia presentations • Internet connection • Students shall not disrupt the course by engaging in interpersonal discussions, using mobile phones or other electronic devices, except when taking notes or when requested to do so as part of the course interaction. • Student are not allowed to be late for the courses, as it proves disruptive to the educational process. • Protecting the intellectual property of the course holder's syllabus and all auxiliary materials distributed to students.
5.2. for teaching the practical lesson	• Computer equipment and software for multimedia presentations • Internet connection • Students shall not disrupt the course/seminar by engaging in interpersonal discussions, using mobile phones or other electronic devices, except when taking notes or when requested to do so as part of the course interaction. • Student are not allowed to be late for the courses/seminar, as it proves disruptive to the educational process. • Protecting the intellectual property of the course holder's syllabus and all auxiliary materials distributed to students.

6. Learning outcomes*

Knowledge	Skills	Responsibility and autonomy
• The student/graduate describes and explains the importance and role of medical technologies and devices in the health care field • The student/graduate describes, explains, and identifies the	• The student/graduate analyzes the role of medical technologies and devices in health care practice • The student/graduate correctly and efficiently identifies the devices and equipment specific to each medical specialty	The student/graduate applies basic knowledge of devices and equipment in specific medical specialties, and identifies opportunities for further study in clinical years

devices and equipment specific to each medical specialty included in the content of the course The student/graduate explains the role of artificial intelligence in Medicine and identifies cases in which it is used in different medical specialties	- The student/graduate demonstrates the ability to critically evaluate the use of devices and equipment of a medical specialty in a given context - The student/graduate demonstrates the acquisition of skills to identify the usefulness of artificial intelligence in the medical specialties included in the study material	
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7. Subject learning objectives (correlated with learning outcomes)

7.1. General objective	The Medical Devices and Equipment subject aims to equip students with fundamental knowledge about medical devices and equipment in various medical specialties, as well as their use in the health care systems.
7.2. Specific objectives	- To provide students with an optimal understanding of the concepts and usage of instruments, devices, and equipment employed in different medical specialties; - To apply a critical approach to medical devices and equipment; - To develop the knowledge, skills, and experience necessary to identify and optimally use medical devices and equipment by type of specialty.

8. Contents

8.1. Course	Teaching methods	Observations Unit of measurement – course hours
1. Medical Technology and Medical Devices Technology: its role and importance in medical practice; A brief history of the evolution of technology in medical practice; Quality management in medical technology; The conceptual framework of medical technology	Interactive course, debate, and interactive presentation according to the curriculum, using information from the literature, examples	2
2. Medical equipment used in Gastroenterology and Oncology Medical equipment used in Gastroenterology: Brief history of digestive endoscopy; Equipment used in upper digestive endoscopy: Endoscope components, Classification of endoscopes, Basic endoscope systems; Accessories used in upper digestive endoscopy; Equipment used in lower digestive endoscopy Medical equipment used in Oncology: Radiotherapy (general information, effects,		2

techniques); Chemotherapy (general information, types); Hyperthermic therapy (general information, types); Radiofrequency ablation (general information, approaches to radiofrequency ablation, complications and indications for radiofrequency ablation)	using the conclusions of case studies, through multimedia tools in Microsoft PowerPoint and AVI formats for movies with an educational approach.	
3. Medical equipment used in Pneumology and in Anesthesia and Intensive Care • Medical equipment used in Pneumology: Role, classification; Endobronchial examination (bronchoscopy); Equipment and devices used for respiratory sampling; Measurement of total lung volumes; Assessment of pulmonary gas exchange • Equipment used in the Anesthesia and Intensive Care: Vital signs monitor; Oximetry monitoring devices; Cardiac output monitoring devices; Capnograph; Electroencephalograph (EEG)		2
4. Equipment used in Urology and Obstetrics-Gynecology • Equipment used in Urology: Renal-vesical radiography, intravenous urography, urethrography, renal scintigraphy, cystoscopy, ureteroscopy, nephroscopy • Medical equipment used in Obstetrics and Gynecology: gynecological chair, gynecological examination table, gynecological operating table, colposcope, hysteroscope, ultrasound scanner; Laparoscopy; Lasers		2
5. Medical equipment used in Orthopedics and Traumatology Equipment used in the operating room: orthopedic table, Tourniquet pneumatic hemostatic band, orthopedic electric motors, arthroscope, fluoroscope/mobile C-arm, orthosonic system for cemented arthroplasty revision - OSCAR		2
6. Equipment for Plastic surgery, cosmetic surgery, reconstructive microsurgery, and Neurosurgery • Plastic, aesthetic, and reconstructive microsurgery equipment: Equipment necessary for diagnosis and monitoring in plastic surgery pathology: Doppler ultrasound, three-dimensional technology; Devices used in plastic and reconstructive surgery: Skin graft, dermatome, mesh graft; Devices for drilling and cutting bone or soft tissue; Devices used in fat deposit remodeling: Liposuction, Lipofilling • Neurosurgery equipment: Operating microscope (history, components); Bipolar electrocoagulation; Electrocoorticography and cortical stimulation; Neuronavigation		2
7. Artificial intelligence in Medicine Brief history of artificial intelligence with applications in Medicine; Chatbot technologies; Generative artificial		2

intelligence in medicine; Clinical administrative support, Clinical decision support, Patient involvement, Synthetic data generation, Professional education; Artificial intelligence in Medicine: creating a safe and equitable future		
Recent bibliography: A. Mandatory References Purcărea V.L. and Radu A.V. (ed.), Medical Devices and Equipment (2nd Ed.). University Course, Carol Davila University Publishing House, Bucharest, 2024		
8.2. Practical lesson	Teaching methods	Observations Unit of measurement – Practical lesson hours
1. Medical devices as part of technology in medical practice What are medical devices; Past, present, and future of medical devices; Use of medical devices; Classification of medical devices	Interactive practical lesson, debate and interactive communication, using information from the literature, examples using the conclusions of academic studies and using multimedia tools in Microsoft Powerpoint and AVI formats for watching movies with an educational approach	2
2. Medical equipment used in Gastroenterology and Oncology • Medical equipment used in Gastroenterology: Examples, role, operating principle; New digestive endoscopy technologies; Specific medical equipment used in gastroenterology: Holter-type computerized esophageal pH monitoring, Esophageal barium transit, Esophageal manometry, Endoscopic capsule • Medical equipment used in Oncology: Radiofrequency ablation (general information, radiofrequency ablation approaches, complications and indications for radiofrequency ablation); Lasers (general information, types of lasers used in medical oncology); Photodynamic therapy		2
3. Medical equipment used in Pneumology and Anesthesia and Intensive Care • Equipment used in Pneumology: Pulse oximetry; Investigation and treatment of sleep apnea syndrome (SAS): Polysomnograph, Polygraph, Devices for the treatment of SASO • Equipment used in the Anesthesia and Intensive Care: Train-of-four (TOF); Breathing devices; Other equipment and devices used in anesthesia and intensive care		2
4. Equipment used in Urology and Obstetrics-Gynecology • Equipment used in Urology: retrograde pyelography, cystography, ultrasonography, urodynamic investigation, laser lithotripsy		2

• Medical equipment used in Obstetrics and Gynecology: Instruments specific to the obstetrics and gynecology specialty; Medical devices and equipment used during pregnancy: fetal monitor, fetal morphology		
5. Medical equipment used in Orthopedics and Traumatology Implants used in orthopedics and traumatology: external fixation with plates and screws, internal fixation with intramedullary rods, types of prostheses used in orthopedics and traumatology		2
6. Equipment for Plastic, aesthetic, and reconstructive microsurgery and Neurosurgery • Plastic, aesthetic, and reconstructive microsurgery equipment: Magnification devices; Devices and injectable biomaterials used in plastic and reconstructive surgery: Breast implants, Injectable biomaterials • Neurosurgery equipment: Craniotome; Ultrasonic aspirator; Neuroendoscope		2
7. Artificial intelligence in Medicine Machine learning in Medicine (supervised machine learning, natural language processing, computer vision, deep learning); Ways in which ML and its subfields can enhance the work of clinicians		2
Recent bibliography: A. Mandatory reference Purcărea V.L. and Radu A.V. (ed.), Medical Devices and Equipment (2nd Ed.). University Course, Carol Davila University Publishing House, Bucharest, 2024 B. Optional references 1. Habibi AA, Bi AS, Owusu-Sarpong S, Mahure SA, Ganta A, Konda SR. History, indications, and advantages of orthopaedic operating room tables: a review. Eur J Orthop Surg Traumatol. 2022 Aug;32(6):1207-1213. doi: 10.1007/s00590-021-03095-w. Epub 2021 Aug 19. PMID: 34414504. 2. Arnold MCA, Zhao S, Doyle RJ, Jeffers JRT, Boughton OR. Power-Tool Use in Orthopaedic Surgery: Iatrogenic Injury, Its Detection, and Technological Advances: A Systematic Review. JB JS Open Access. 2021 Nov 19;6(4):e21.00013. doi: 10.2106/JBJS.OA.21.00013. PMID: 34841185; PMCID: PMC8613350. 3. Raj Singh, Anisha Valluri, Prabhanjan Didwania, Eric J. Lehrer, Sujith Baliga, Susan Hiniker, Steve E. Braunstein, Erin S. Murphy, Stanislav Lazarev, Christopher Tinkle, Stephanie Terezakis, Joshua D. Palmer- Efficacy and Safety of Stereotactic Body Radiation Therapy for Pediatric Malignancies: The LITE-SABR Systematic Review and Meta-Analysis, Adv Radiat Oncol. 2023 Mar-Apr; 8(2): 101123. 4. Chang EF, Kurteff GL, Wilson SM. Selective Interference with Syntactic Encoding during Sentence Production by Direct Electrocortical Stimulation of the Inferior Frontal Gyrus. Journal of Cognitive Neuroscience. 30(3):1-11. doi: 10.1162/jocn_a_01215. 5. Latypov, N.A, Golubev, I.O. Surgical telescopes: basic optical principles and main features, Plastic Surgery and Aesthetic Medicine 2023, no 4, pp. 83-92. 6. Peter J Velthuis, Oscar Jansen, Leonie W Schelke, Hyoungjin J Moon, Jonathan Kadouch, Benjamin Ascher, Sebastian Cotofana, A Guide to Doppler Ultrasound Analysis of the Face in		

Cosmetic Medicine. Part 2: Vascular Mapping, Aesthetic Surgery Journal, Volume 41, Issue 11, November 2021, Pages NP1633–NP1644, <https://doi.org/10.1093/asj/sjaa411>.

7. AI in medicine: creating a safe and equitable future. Editorial. The Lancet. 2023; 402 (10401): 50. DOI:[https://doi.org/10.1016/S0140-6736\(23\)01668-9](https://doi.org/10.1016/S0140-6736(23)01668-9).
8. Chafai N, Bonizzi L. Emerging applications of machine learning in genomic medicine and healthcare. Crit Rev Clin Lab Sci. 2023;1–24. <https://doi.org/10.1080/10408363.2023.2259466>.
9. Chakraborty C, Bhattacharya M, Pal S, Lee S-S. From machine learning to deep learning: Advances of the recent data-driven paradigm shift in medicine and healthcare. Current Research in Biotechnology. 2024; 7, 100164, ISSN 2590-2628, <https://doi.org/10.1016/j.crbiot.2023.100164>.
10. Lu Y, Wu H, et al. Artificial Intelligence in Intensive Care Medicine: Toward a ChatGPT/GPT-4 Way? Ann. Biomed. Eng. 2023; 9, 1898–1903.

9. Evaluation

Type of activity	9.1. Assessment criteria	9.2. Assessment methods	9.3. Assessment weighting in the final grade
9.4. Course	Clarity and coherence of concepts specific to the subject	Multiple-choice written exam, with 30 questions and a single possible answer	90%
	The ability to understand the specific concepts		
9.5. Practical lesson	Active participation in the practical lessons' activities	A minimum of 70% attendance at the practical lessons	10%
9.6. Minimum performance standards			
- To pass this subject, students must obtain a final grade of at least 5 (five). The written exam consists of 30 multiple-choice questions with a single possible answer. The time allocated for the exam is 30 minutes. - A minimum of 14 questions must be answered in the written exam. - Attendance in the laboratory must be at least 70%.			

Date of filling:

15.09.2025

Signature of the course tenured coordinator

Senior Lecturer Iuliana Assistant Professor Soare Traian
Raluca Gheorghe

Assistant Professor Ioachim
Marinela

Assistant Professor Nistor Raluca

Date of approval by the
Department Committee:

Signature of the Head of the Department
Prof. Mincă Dana Galieta