

COURSE CONTENT

(1) GENERAL INFO

SCHOOL	ENGINEERING		
DEPARTMENT	BIOMEDICAL ENGINEERING		
MSc PROGRAM	BIOMEDICAL ENGINEERING AND TECHNOLOGY		
STUDY LEVEL	POSTGRADUATE, MSc		
COURSE CODE	BMET104	SEMESTER	A
COURSE TITLE	The biomedical engineering industry sector I		
TEACHING		HOURS	ECTS
	LECTURES	39	5
COURSE TYPE	SPECIALIZATION		
COURSE REUIREMENTS:	-		
TEACHING AND EXAMINATION LANGUAGE:	ENGLISH		
IS THIS COURSE OFFER TO ERASMUS STUDENTS	YES (IN ENGLISH)		
COURSE WEBPAGE (URL)	https://eclass.uniwa.gr/courses/301/		

(2) LEARNING OUTCOMES

Learning outcomes
<p>Course Objectives: Invited experts from the industry sector will deliver specialized seminars regarding the real-world conditions, outlook and prospects of the biomedical engineering profession.</p> <p>Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Comprehensive understanding of the roles of biomedical engineering in the labor market, distinguish different career paths and prospects. 2. Recognize the interdisciplinary nature of biomedical engineering and its integration with medicine and technology. 3. Critical evaluation of industry trends and challenges. <p>Achievement of Course Objectives and Learning Outcomes: To fulfill the above objectives and learning outcomes, invited experts from the biomedical sector will deliver specialized seminars that will discuss, analyze and elaborate on subjects related to service, calibration, repair, installation, and quality control of biomedical equipment, sales, promotion and marketing of biomedical products, application specialists' domains, clinical and hospital engineering, research in biomedical engineering, education and certification in biomedical engineering, career prospects in biomedical engineering, patenting and designing of novel biomedical engineering products, development of stat-up companies.</p>
General abilities
<ul style="list-style-type: none"> • Search, analysis and synthesis of data and information, using the necessary technologies • Adaptation to new situations • Decision-making • Autonomous work • Teamwork • Working in an international environment • Working in an interdisciplinary environment

(3) COURSE CONTENT

"Biomedical engineer at the industry"

Definitions, basic concepts, service, calibration, repair, installation, and quality control of biomedical equipment, sales, promotion and marketing of biomedical products, application specialists' domains, product development, user training, customer support.

"Biomedical engineer at the hospital"

Definitions, basic concepts, medical equipment management, installation and calibration, maintenance and repairs, evaluation of new technologies, safety and regulatory issues, clinical support, research, information technology support and integration, quality Assurance, ethics, collaboration with vendors, emergency response.

"Development of a start-up company"

Definitions, basic concepts, understanding entrepreneurship, overview of the startup environment, key players (Founders, Investors, Mentors), importance of innovation, business ideas, market needs, business plan, financial issues, legal and regulatory issues, team building and human resources, success stories and case studies.

"Biomedical engineer at a researcher center"

Definitions, basic concepts, types and purposes of research centers, innovation and knowledge, collaborations and partnerships, funding and resource management, organizational structure, roles and responsibilities, financial issues, legal and regulatory issues, team building and human resources, success stories and case studies.

"Biomedical engineer as an innovator of new technologies"

Definitions, basic concepts, introduction to intellectual property, patents, trademarks, copyrights, role of patents in biomedical engineering, patenting process, patent search, drafting a patent application, patent submission and response to evaluation outcomes, ethics and regulatory affairs.

(4) TEACHING AND LEARNING METHODS - EXAMINATIONS

COURSE DELIVERY	Physical presence, face to face at the auditorium	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	The course involves the use of a projector for presenting fundamental concepts and is supplemented by the use of the blackboard at the auditorium.	
TEACHING ORGANIZATION	Activity	Semester workload
	Teaching / lectures	39
	Lecture material study	30
	Unsupervised literature review and preparation of the final project	56
	Total	125
STUNDET EVALUATION	100% individual written assignment and presentation.	

(5) SUGGESTED LITERATURE

Books, scientific articles and related scientific resources:

- [1] R. A. Linsenmeier, "What makes a biomedical engineer?" in IEEE Engineering in Medicine and Biology Magazine, vol. 22, no. 4, pp. 32-38, July-Aug. 2003.
- [2] Mummolo, G., The future for industrial engineers: education and research opportunities. European Journal of Engineering Education, 2007. 32(5): p. 587-598.
- [3] Jamison CSE, Wang AA, Huang-Saad A, Daly SR, Lattuca LR. BME Career Exploration: Examining Students' Connection with the Field. Biomed Eng Educ. 2022;2(1):17-29.

- [4] Ropella KM. biomedical engineering: the career of choice. IEEE Eng Med Biol Mag. 2003;22:23–25.
- [5] Berglund J. The real world: BME graduates reflect on whether universities are providing adequate preparation for a career in industry. IEEE Pulse. 2015;6:46–49.
- [6] Glotsos, D., Kostopoulos, S., Liaparinos, P. et al. The Biomedical Engineering Labor Market in Greece: A Survey Investigating Job Outlook, Satisfaction and Placement. Biomed Eng Education 3, 51–60 (2023).
- [7] Miculescu, M.; Ion, O.A. Regulation and Certification of (Bio)Medical Engineers: A Case Study on Romania. Int. J. Environ. Res. Public Health 2022, 19, 9004.
- [8] Maccaro, A., Pagliara, S.M., Zarro, M. et al. Ethics and biomedical engineering for well-being: a cocreation study of remote services for monitoring and support. Sci Rep 13, 14322 (2023).
- [9] Shreefal S. Mehta, Commercializing Successful Biomedical Technologies: Basic Principles for the Development of Drugs, Diagnostics and Devices, Cambridge University Press; 1st edition, 2008.
- [10] T. Neumann, R. Brück and O. Gaus, "Business Plan Ready - An Interdisciplinary Approach in Teaching and Learning how to Start-Up in Biomedical Engineering," 2023 IEEE Global Engineering Education Conference (EDUCON), Kuwait, Kuwait, 2023, pp. 1-6.
- [11] Jen-Shih Lee, Biomedical Engineering Entrepreneurship, World Scientific, 2010.

Scientific journals:

- [1] Research on Biomedical Engineering, <https://link.springer.com/journal/42600>.
- [2] IEEE Transactions on Biomedical Engineering, <https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=10>.
- [3] Journal of Biomedical Instrumentation and Applications, <https://norcaloa.com/BMIA>.
- [4] Biomedical Sciences Instrumentation, <https://journal.rmbs.org/index.php/BiomedSciInstrum>.
- [5] IEEE Reviews in Biomedical Engineering, <https://www.embs.org/rbme/>.