საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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Academic Council of GTU
2012 05 May
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Master's Educational Program

Title of Program

ბიოსამედიცინო ინჟინერია
Biomedical Engineering

Faculty

ინფორმატიკის და მართვის სისტემების ფაკულტეტი
Faculty of Informatics and Control Systems

Program Supervisor/ Supervisors

Professor Irine Gotsiridze

Qualification to be Awarded and the Number of Credits in the Program

Master of Biomedical Engineering will be awarded in case of passing not less than 120 credits of an educational program.

Teaching Language

English

Admission Prerequisites to the Program

Applicant can apply to Master Degree Program if they have at least a Bachelor or equivalent degree. Applicants who are enrolled on the basis of the results of the Master's Exams, which is organized by National Assessment and Examinations Center (NAEC) through "Unified National Exams" and receive enough scores to be admitted to the by passing special exam defined by GTU. Applicants are required to have English language knowledge at B2 level. The applicant must have the certificate confirming the knowledge of English on the level not less than B2 and must present international certificate. The applicant is free from the necessity of presenting a certificate confirming his/her competence at having completed Bachelor course in the foreign language if educational language of the program was English.
Examinations / tests will be posted on the website of the GTU.
http://www.gtu.ge/study/index.php at least one month before the exams will start
Non resident applicant has the right to apply BME educational program, in accordance with Georgian legislation.

Program Description

The program is drawn up with European Credit Transfer System (ECTS). In GTU 1 credit is equal to 25 hours, which include the contact and independent working hours. The distribution of credits is presented in the curriculum. The program duration is 2 years (4 semesters) and includes 120 credits (ECTS). Learning component - 75 credits and research component 45 credits.

Research component

Research component according to the topic of the Master's Thesis, which is carried out in the Georgian Technical University and in the relevant organization defined by the Memorandum of Understanding.
For detailed information about the evaluation procedure of the Master's Education Program Research Component, see the following e-mail address:
https://gtu.ge/Learning/debuleba_magistraturis_sesaxeb.php

Instruction for submitting for Master's Degree is available at the following E-mail address:
http://gtu.ge/pdf/magistraturis_debuleba_danarti_5.pdf

Schedule of the academic year:

From the original, fall and spring semesters of the school year.
Training schedule, midterm and final / additional exam deadlines by the order of the rector of the possible department of each semester, on the basis of the "Instruction for the management of the educational process at the Georgian Technical University".
To get detailed information, get acquainted with Georgian Technical University's Regulations on Master's Degree:

Program Analogues
https://liu.se/en/education/program/6mbme
http://www.chalmers.se/en/education/programmes/masters-info/Pages/Biomedical-engineering.aspx
https://bme.duke.edu/grad

Educational Program Website;
http://biomedeng.gtu.ge/programebi.html

https://bmegtu.wordpress.com

In development and carrying out monitoring of the program is included "Committee of Support for Developing of BME Study", which is founded at the "Biomedical and Clinical Engineering Society of Georgia", Committee is comprised with 5 members.

Program Objective

The objectives of program are:

- to integrate engineering and life science principles into a comprehensive curriculum, that prepares students for successfully practice biomedical engineering to serve state and regional industries, hospitals, government agencies, or national and international industries, for entry into the doctoral program
- prepare students for primary research areas in medical instrumentation, biomedical signal processing, biomedical implants and devices, cardiac electrophysiology, multiscale computational modeling, tissue and rehabilitation engineering,
- to provide graduates with a rigorous, broad-based advanced education in engineering coupled with applied biology that will prepare graduates for the many diverse career opportunities of biomedical engineering.
- to provide an empowering professional degree for students who intend to become practicing engineer researchers.
- to provide students for further acquire advanced training in one or more of Biomedical Engineering fields of expertise

Learning Outcomes/Competence (general and professional)

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics;
2. an ability to analyze and interpret data; analyzing, modelling, designing and realizing bio/biomedical engineering devices, systems, components or processes;
3. an ability to apply engineering, design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global. Cultural, social, environmental and economic factors.
4. an ability to function effectively on team whose members (biologists, chemists, medical doctors, healthcare providers) together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives;
5. an ability to deliver effective presentations of engineering results in written and oral formats
6. life-long learning skills and ability to apply their engineering knowledge to critically evaluate relevant literature and new technologies or systems.
7. an ability to evaluate the impact of their work on society, including ethical, economic, global and environmental aspects.
8. responsibility to be effective leaders, capable of working in diverse environments

Methods of Achieving Learning Outcomes (Teaching - Learning)

Lecture Seminar (working in groups) Practical class Laboratory Practice
Course work/project Consultation Independent work

Based on the specifics of a learning course, the appropriate activities listed below are employed, reflected in the relevant learning courses (syllabi):

1. Discussions,/debates
2. Collaboratiev learning
3. Problem Bases Leaning
4. Case study
5. Brain storming
6. Demonstration
7. Analise
8. Synthesis
9. Verbal
10 .Writing
11. Explanation
12. Action-oriented learning
13. Project Development and Presentation

Student Knowledge Assessment System

Grading system is based on a 100-point scale.

Positive grades:

- **(A)** - Excellent - grades between 91-100 points;
- **(B)** – Very good - grades between 81-90 points
- **(C)** - Good - grades between 71-80 points
- **(D)** - Satisfactory - grades between 61-70 points
- **(E)** - Pass - the rating of 51-60 points

Negative grades:

- **(FX)** - Did not pass - grades between 41-50 points, which means that the student is required to work more to pass and is given the right, after independent work, to take one extra exam;
- **(F)** – Failed - 40 points and less, which means that the work carried out by the student did not bring any results and he/she has to learn the subject from the beginning.

The procedure for evaluating the research component of a master's degree program is given on the university's website.
https://gtu.ge/Study-Dep/Forms/Forms.php

Sphere of Employment

Biomedical engineers are employed in industry, in hospitals, in research facilities of educational and medical institutions, in teaching, and in government regulatory agencies. They often serve a

coordinating or interfacing function, using their background in both the engineering and medical fields. In industry, they may create designs where an in depth understanding of living systems and of technology is essential. They may be involved in performance testing of new or proposed products. Government positions often involve product testing and safety, as well as establishing safety standards for devices. In the hospital, the biomedical engineer may provide advice on the selection and use of medical equipment, as well as supervising its performance testing and maintenance. They may also build customized devices for special health care or research needs. In research institutions, biomedical engineers supervise laboratories and equipment, and participate in or direct research activities in collaboration with other researchers with such backgrounds as medicine, physiology, and nursing. Some biomedical engineers are technical advisors for marketing departments of companies and some are in management positions
In representative firms of vendors of medical devices,for carrying out of markteting and service. Also as Health Information Technology (HIT) specialists of information technologies for processing of medical information. Biomedical engineers can also employ themselves in research activities by working harmoniously with doctors in the field of computational mechanics, physiology, medicine and invent cutting - edge technology

Potential for Further Education

Doctoral Educational Programs

Human and Material Resources Required to Implement the Program

The program provides the appropriate human and material resources. In the program implementation, there are involved professors from West Pomeranian University of Technology according the Co-Operation Agreement between Georgian Technical University and West Pomeranian University of Technology. For more information see the attached syllabi and other attachment documentation.

Number of Attached Syllabuses: 12

Courses in the Program

№	Learning and Research Component	Course Prerequisites	ECTS Credits			
			I Year		II Year	
			Semester			
			I	II	III	IV
1	Bioinstrumentation	Don't have	10			
2	Physiology for Engineers	Don't have	5			
3	Biomaterials	Don't have	5			
4	Biomechanics	Don't have	5			
5	Biosensors	Don't have	5			

	Obligatory Elective					
6.1	Tissue Engineering	Biomaterials		5		
6.2	Rehabilitation Engineering	Biomechanics Biomaterials				
7	Medical Informatics	Don't have		5		
8	Health Care Management and Economics	Don't have				
9	Medical Imaging and Image Analysis	Physiology for Engineers		10		
10	Mathematical Models in Biology and Medicine	Medical Informatics			10	
11	Clinical Engineering	Bioinstrumentation			10	
	Master Research Project / Prospectus	Don't have		5		
	Theoretical / experimental research / colloquium	Master Research Project / Prospectus			10	
	Accomplishment and Defense of Master's Thesis	All obligatory Learning and Researc Components				30
		Per semester	**30**	**30**	**30**	**30**
		Per Year:	**60**		**60**	
		Total:	**120**			

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Program Curriculum

№	Learning Course Identification Code	Learning Course	ECTS Credit/Hours	Hours								
				Lecture	Seminar (work in the group)	Practical classes	Laboratory	Practice	Course work/project	Mid-semester exam	Final exam	Independent work
1	EET34608E1-LP	Bioinstrumentation	10/250	30		45				1	2	172
2	BRS10808E1-LB	Physiology for Engineers	5/125	15			30			1	2	77
3	EET34708E1-LP	Biomaterials	5/125	15		30				1	2	77
4	EET34808E1-LP	Biomechanics	5/125	15		30				1	2	77
5	EET34908E1-LP	Biosensors	5/125	15		30				1	2	77
6.1	EET35008E1-LP	Tissue Engineering	5/125	15		30				1	2	77
6.2	EET31208E2-LS	Rehabilitation Engineering	5/125	15	30					1	2	77
7	EET38108E1-LP	Medical Informatics	5/125	15		30				1	2	77
8	EET38208E1-LS	Health Care Management and Economics	5/125	15	30					1	2	87
9	EET35108E1-LR	Medical Imaging and Image Analysis	10/250	30		45				1	2	172
10	EET32308E2-LP	Mathematical Models in Biology and Medicine	10/250	30		45				1	2	172
11	EET35208E1-LR	Clinical Engineering	10/250	15				100		1	2	132

Program Supervisor/Supervisors Irine Gotsiridze

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Chairman of the Faculty Council Zurab Tsveraidze