საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved by Academic Council of GTU on
"_05__" "September" 2012
by Decree № 740

Master's Degree Program

Program Title

Biomedical Engineering

Faculty

Informatics and Control Systems

Program Supervisor

Full Professor Irina Gotsiridze

Awarded Qualification

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

Language

English

Program Objective

The program educational objectives of biomedical engineering program is to integrate engineering and life science principles into a comprehensive curriculum, that prepares students for entry into the doctoral program, biomedical industry, or professional school. Primary research areas are biomedical imaging, biomedical implants and devices, cardiac electrophysiology, multiscale computational modeling, tissue engineering and regenerative medicine. Programm 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. Provide an empowering professional degree for students who intend to become practicing engineers .

Program prerequisites

Applicant is admitted in compliance with the Georgian Legislation

Learning Outcome/Competencies

– **Knowledge and understanding**: Deep knowledge of the field of Biomedical Enginering, critical understanding of theories and principles, understanding of field's complex issues; Develop a through understanding of advanced principles in Biomedical Engineering. Awareness of current and leading-edge topics in Biomedical Engineering. To understand the biological bases of the assessments routinely performed by Biomedical Engineers;
– **Applying Knowledge:**Using of the specific for the field of Biomedical Engineering problem-solving methods; Development of research or practical projects in the accordance; Develop critical review skills, in the area of Bio-Medical Engineering. To develop the ability to critically evaluate current advances in issues and controversies in the area of Biomedical Engineering. An ability to apply knowledge of mathematics, science, and engineering to biomedical engineering problems. An ability to design and conduct experiments, as well as to

analyze and interpret data . An ability to design a system, component, or process to meet desired needs. An ability to identify, formulate, and solve engineering problems . An ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems. A knowledge of biology and physiology . Clear public presentation of opinions in accordance with corresponding knowledge and logic for professional and general audience. An ability to use the techniques, skills, and modern engineering and computing tools necessary for engineering practice . An ability to function on multi-disciplinary teams . The capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve the problems at the interface of engineering and biology. A recognition of the need for, and an ability to engage in life-long learning . A knowledge of contemporary issues

- **Making judgments:** The broad education necessary to understand the impact of engineering solutions in a global and societal context , also analysis of abstract data and/or situations analysis by the mean of standard and some distinctive methods and form of the reasoned conclusions on their basis;

– **Communication skills:** An ability to communicate effectively orally and in writing . preparing of detailed written reporting concerning Ideas, existing problems and their solutions; information pass orally to professionals and non professionals in утпдшыр and foreign languages; Creative use of modern engineering, information and communication technologies; Skill to communicate in native and foreign languages;

– **Learning skills:** multilateral and consistent assessment of own learning process; determining of necessity of further studying; determining of directions of own learning with the goals of enrichment of professional knowledge and experience.

– **Values:** Participation in the process of values formation and aspirations to their sustainable implementation; Defense of professional values (accuracy, punctuality, objectivity, transparency, organization, etc.); An understanding of professional and ethical responsibility

Forms and Methods of achieving of the learning outcomes

☒ Lecture ☒ Seminar (working in the group) ☒ Practical classes ☒ Laboratory classes ☒ Practice

☐ Course Work/Project ☐ Independent Work

Forms and Methods of achieving the learning outcomes are included to the Educational Program and can be find via the following link: http://www.gtu.ge/quality/pdf/sc.pdf

Student's Knowledge Assessment

Assessment is based on a 100 point grading scale.

Positive assessment is:

- **(A)** - excellent - 91% and more of the maximum grade;
- **(B)** - very good - 81-90% of the maximum grade;
- **(C)** - good - 71-80% of the maximum grade;
- **(D)** - satisfactory - 61-70% of the maximum grade;
- **(E)** - enough - 51-60% of the maximum grade;

Negative assessment is:

- **(FX)** - not passed - 41-50% of the maximum grades. It means that a student needs more individaul work, and is given one more possibility to pass the exam;
- **(F)** - failed - 40% and less of the maximum grade. It means that work performed by a student was not enough and the subject should be learnt from the beginning;

For assessment methods, criteria and scales please refer to the following link:
http://www.gtu.ge/quality/axali/shefasebisforma.pdf.

For assessment Resarch Components please refer to the following link:
http://www.gtu.ge/study/scavleba/samag_Sefas.pdf

Spheres of Employment

Organizations and companies which perform: improve equipment, such as heart valves and artificial limbs as well as contribute to develop various medical devices such as heart pacemakers. They may research with scientists, chemists, and physicians in hospitals and universities. They also help maintain and monitor complex medical systems while working in hospitals.
Enormous job opportunities in varied spheres like medical equipments manufacturing, orthopedic and rehabilitation engineering, molecular, cellular and tissue engineering in public and in corporate sectors are available for the biomedical engineers. They can also be absorbed in hospitals to provide valuable advice on the status of medical equipments. 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.

Possibilities for further continues education

Doctoral educational programs.

Required human and material resources

The program provides the appropriate human and material resources. For more information see the attached syllabi.

Sceme of Master Educational Program

№	Learning and Scientifical Components		I Year		II Year		Credits
			Semester I	Semester II	Semester III	Semester IV	
	Learning Componenrs;						
1	Learning Courses		30	25	20		75
	Scientifical Component:						
2	Master Project Thesis /Prospectuse			5			5
3	TheoreticalPractical Research/Coolloguim				10		10
4	Master Thesis					30	30
ECTS Credits		Per Semesters	30	30	30	30	120
		Per Courses	60		60		120

The number of attached syllabi: 11

№	Course code	Course	Prerequisite	ECTS Credits			
				I Year		II Year	
				Semester			
				I	II	III	IV
1	BNSTE8	Bioinstrumentation	Don't have	10			
2	PHEN1E8	Physiology for Engineers	Don't have	5			
3	BMTR1E8	Biomaterials	Don't have	5			
4	BMCH1E8	Biomechanics	Don't have	5			
5	BSNS1E8	Biosensors	Don't have	5			
6	TSEN1E8	Tissue Engineering	Don't have		5		
7	MEDI1E8	Medical Informatics	Don't have		5		
8	HMNG1E8	Health Care Management and Economics	Don't have		5		
9	MIIA1E8	Medical Imaging and Image Analysis	Don't have		10		
10	MMBM1E8	Mathematical Models in Biology and Medicine	Don't have			10	
11	CLE01E8	Clinical Engineering	Don't have			10	
12		Research component			5	10	
13		Master Thesis					30
				30	30	30	30
			In year	**60**		**60**	
			Total	**120**			

Map of study results

№	Course code	Course	General and technical competencies					
			Knowledge and understanding	Applying knowledge	Making judgments	Communication skills	Learning skills	Valuebs
1	BINST1E8	Bioinstrumentation	x	x	x			
2	PHEN1E8	Physiology for Engineers	x	x			x	
3	BMTR1E8	Biomaterials	x	x	x			
4	BMCH1E8	Biomechanics	x	x	x			
5	BSNS1E8	Biosensors	x	x	x			
6	TSEN1E8	Tissue Engineering	x		x			x
7	MEDI1E8	Medical Informatics	x		x	x		
8	HMNG1E8	Health Care Management and Economics	x		x	x		
9	MIIA1E8	Medical Imaging and Image Analysis	x	x	x			
10	MMBM1E8	Mathematical Models in Biology and Medicine	x	x	x			
11	CLE01E8	Clinical Engineering	x	x	x	x		
12		Research component	x	x	x		x	
13		Master Thesis	x	x	x			x

Program Curriculum

№	Course code	Course / Hours	ECTS Credit\ Hour	Lecture	Seminar (group work)	Practical Work	Laboratory Work	Practice	Course Work/Project	Independent Work
1	BNST1E8	Bioinstrumentation	10/270	60		60				150
2	PHEN1E8	Physiology for Engineers	5/135	30			30			75
3	BMTR1E8	Biomaterials	5/135	30		30				75
4	BMCH1E8	Biomechanics	5/135	30		30				75
5	BSNS1E8	Biosensors	5/135	30		30				75
6	TSEN1E8	Tissue Engineering	5/135	30		30				75
7	MEDI1E8	Medical Informatics	5/135	30		30				75
8	HMNG1E8	Health Care Management and Economics	5/135	30	30					75
9	MIIA1E8	Medical Imaging and Image Analysis	10/270	60		60				150
10	MMBM1E8	Mathematical Models in Biology and Medicine	10/270	60		60				150
11	CLE01E8	Clinical Engineering	10/270	60				60		150
12		Research component	15/305							
13		Master Thesis	30/540							

Educational Program Supervisor Irina Gotsiridze

The Head of Quality Assurance Service at the
Faculty of Informatics and Control Systems Zurab Baiashvili

Accepted at
The Council of the Faculty
Informatics and Control Systems

03/ September /2012
Protocol № 6
The Head of the Faculty Council Zurab Tsveraidze

Agreed with
Quality Assurance Service of GTU Giorgi Dzidziguri