MS in Computer Engineering

Program Overview:

Computer Engineering is fast emerging and an exhilarating field offering diverse career paths in both software development and hardware engineering. Computer Engineers apply engineering techniques and computer science concepts to develop reliable, cost-effective hardware and software solutions catering to the challenging demands of industries ranging from healthcare to environmental sciences.

Computer engineering is a discipline that embodies the science and technology of design, construction, implementation, and maintenance of software and hardware components of modern computing systems and computer-controlled equipment.

At the Department of Computer Engineering, students are encouraged to hone the right mix of expertise covering both software programming and hardware design and implementation to be able to design and utilize computing systems for industrial automation (to handle different processes and machinery in an industry to replace a human being), embedded systems (found in devices from a digital wristwatch to the space shuttle), robotics (to use machines to perform tasks done traditionally by human beings), multimedia (to combine and use multiple media formats i.e. text, audio, still images, animation, video and interactivity together), and artificial intelligence (to design and program machines to think like humans and mimic their actions).

Areas of Research:

- Parallel and Distributed Computing
- Networks, Distributed Systems, and Security
- Artificial Intelligence
- Robotics
- Architectures, Embedded Systems
- High Performance Computing
- Software Engineering and Programming languages
- Human Computer Interaction
- High Performance Microprocessor-based Design
- Embedded Systems
- Operating Systems
- Information Theory and Cryptography
- Expert Systems

For more information, please refer to faculty profiles for their research field on the Department website.

Admission Requirement:

16 years of education or equivalent e.g. B.E/BS – 4 years in the relevant field from HEC recognized university with at least 60% marks (Annual System) or CGPA 2.5 out of 4.0 (Semester System).

GAT general with at least 50% marks or GAT subject with at least 60% marks or HAT for the admission /scholarship in the specific program of study.

For more information on application deadlines, tests and other admission requirements, please visit the admissions section of the Graduate Studies Office

Program Requirements:

The minimum and maximum duration of MS program is 1.5 to 4 years. Students must meet the following requirements for graduation:

- A minimum of 24 credit hours course work with a minimum CGPA of 2.5
- Successful defense of synopsis/ research proposal and its approval from Advanced Studies and Research Board (AS&RB).
- A minimum of 6 credit hours research work/ thesis.
- Thesis defense and viva.

Program Structure:

#	Course Codes	Course Title	Credit Hours
FIRST SEMESTER			
1	CE-612	Advanced Computer Systems Architecture	3 + 0
2	CS-641	Advanced Operating System	3 + 0
3	TE-502	Advanced Computer Networks	3 + 0
4		Specialization Elective-I	3 + 0
SECOND SEMESTER			
1		Specialization Elective-II	3 + 0
2		Elective I (General)	3 + 0
3		Elective-II (General)	3 + 0
4		University Elective-I	3 + 0
THIRD SEMESTER			
1		Thesis	6 + 0
		TOTAL	**6**
		Total Courses	**24**
		Total Credit Hours	**30**

* Candidate has to select one (1) course from University Electives, minimum of two (2) courses from one of the specialization streams and two (2) elective courses from any stream.

S.No	Course title	Credit hours
	List of Specialization electives	
I.	**Digital Signal Processing**	
1	Statistical Signal Processing	3+0
2	Video Signal processing	3+0
3	Real Time DSP	3+0
4	Speech and Audio Processing	3+0
5	Array Signal Processing	3+0
6	Multi Rate Signal Processing	3+0
II.	**Digital Image Processing and Computer Vision**	
1	Digital Image Processing	3+0
2	Pattern Recognition	3+0
3	Advanced Computer Graphics	3+0
4	Medical Image Processing	3+0
5	Multimedia Systems	3+0
6	Computer Vision	3+0
7	Robotic Vision	3+0
8	Image and Video Coding	3+0
III.	**Computer Network and Distributed Computing**	
1	Queuing Theory	3+0
2	Mobile and Wireless Networks	3+0
3	Parallel and Distributed Computing	3+0
4	Advanced Security and Forensics	3+0
5	Multimedia Services Over IP Networks	3+0
6	Cluster and Cloud Computing	3+0
7	Mobile and Pervasive Computing	3+0
8	Routing and Switching	3+0
9	High Performance Networks	3+0
10	Internet of Things	3+0
IV.	**Communictions**	
1	Advanced Digital Communication	3+0
2	Advanced Mobile & Wireless Communication	3+0
3	Software Defined Radios	3+0
4	Satellite Communication	3+0
5	Optical Communications and Networks	3+0

6	Antenna Design	3+0
7	Microwave Engineering	3+0
8	Advanced Engineering Electromagnetics	3+0
9	Radar Engineering.	3+0
10	Wireless Sensor Networks	3+0
11	Telecom Management Network	3+0
12	QOS in Telecommunication Networks	3+0
13	Telecom Policies and Regulations	3+0
14	Tele Traffic Engineering	3+0
15	Switching and Transmission Techniques	3+0
16	Next Generation Networks	3+0
17	Broadband Communications	3+0
18	Network Planning and Optimization	3+0
19	Navigation Aids	3+0
V.	**Artificial Intelligence and Scientific Computing**	
1	Advanced Artificial Intelligence	3+0
2	Fuzzy Logic & Neural Networks	3+0
3	Knowledge Engineering & Expert Systems	3+0
4	Machine Learning	3+0
5	Graph Theory	3+0
6	Advance Numerical and Simulation Techniques	3+0
7	Analysis of Stochastic Processes	3+0
8	Natural Language Processing	3+0
9	Genetic Algorithms	3+0
10	Knowledge Management	3+0
11	Deep Learning	3+0
VI.	**Software Engineering**	
1	Advanced Software Engineering	3+0
2	Advanced Software Quality Assurance	3+0
3	Software and System Architecture	3+0
4	Software Risk Management	3+0
5	Global Software Engineering	3+0
6	System Costing and Estimation	3+0
7	Business Process Re-engineering	3+0

List of Electives

8	Formal Methods in Software Engineering	3+0
9	Semantic Web	3+0
10	Model Driven Software Development	3+0
11	Software Process Engineering	3+0
12	Web Engineering	3+0
13	Advanced Human Computer Interaction	3+0
14	Software Process Management and Improvement	3+0
15	Agent Oriented Software Engineering	3+0
VII.	**Hardware Design**	
1	Fault Tolerant Computing	3+0
2	Nanotechnology	3+0
3	Fault Diagnosis and Testing	3+0
4	Advanced Embedded System Design	3+0
5	VLSI Principals and Applications	3+0
6	Advanced Parallel Systems	3+0
7	Interconnection Networks	3+0
8	System on Chip Design	3+0
9	Advanced Microprocessor Design	3+0
VIII.	**Data Base Management and Data Mining**	
1	Advanced Database Management Systems	3+0
2	Multimedia Systems	3+0
3	Data Mining	3+0
4	Big Data Analytics	3+0
5	Online Analytical Processing	3+0
6	Data Warehousing	3+0
7	Special Topics in Data Sciences	3+0
	University electives	
1	Scientific Writing and Research Methodology	3+0
2	Optimization Methods	3+0
3	Network Planning and Optimization Methods	3+0
4	Simulation Modeling	3+0

Contact Information:

Dr. Sibghatullah Bazai
Incharge Chairperson Computer Engineering
sibghat.ullah@buitms.edu.pk
Phone No. :+92 (81) 2899911 Ext. 712

Dr. Muhammad Imran Qureshi
Graduate Program Manager Computer Engineering
engr.imran@buitms.edu.pk
Phone No. :+92 (81) 2899911 Ext. 411