Faculty of Information Technology



Dr. M. Ahmad Shabbir Kazmi Dean

edge technologies.

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Faculty of Information Technology

We have made major strides in 2019-2020 - achieving significant improvements in the quality of teaching and increasing the breadth and inter-disciplinary nature of the research portfolio of the faculty. Our plans for the coming year are even more ambitious. Our existing research centers continue to mature while the groundwork for new ones is in process. All research activities, at FoIT, are geared to realize our primary mission: analyze and diagnose problems encountered in the real world, conduct research and develop innovative, independently verifiable solutions. We bring the perspectives and powerful techniques of Computer Science to bear on Pakistan's particular socioeconomic challenges, particularly in the fields of data science, game design, health care and campus security. In the process, we are further strengthening our linkages, both with the software industry and with institutions of higher education in Pakistan and abroad.

These improvements translate into a new breed of computer science graduates, young women and men brimming over with energy, ambitious in their objectives, clear on the nature of the challenges facing society and quick to learn new concepts and technologies and thrive in challenging circumstances. Furthermore, we are striving to bring in guest speakers from the industry and develop a relationship with the industry expert. That relationship will provide various opportunities for our students to learn about state of the art, cutting

FoIT has been consistently achieving significant improvements in the quality of both undergraduate and postgraduate education by introducing emerging technologies to increase the breadth and depth of taught courses and research. The efforts have been highly applauded by the professional industry and research communities,

thus, encouraging us to plan even more ambitiously for the coming year. Our state-of-the-art research centers continue to mature while the groundwork for new ones is in process. The novel initiatives undertaken by the FoIT focus on addressing the issues specific to the socioeconomic challenges and problems of Pakistan. We bring the perspectives and powerful techniques of computer science to the fields of data science, game design, learning design, health care, robotics and campus security. Our collaborations with national and international partners promise independently verifiable materialization of our vision to make Pakistan a leader in computer science and software development.

Our major source of strength is the competent, experienced and qualified members of faculty at FoIT. All faculty members continuously engage themselves in efforts to provide a quality learning experience to the students. We are proud to have introduced an indigenously developed process to monitor students' progress on daily basis and enabling teachers to respond effectively and efficiently to any learning difficulties faced by the students. These improvements, brought in through the untiring efforts of our team, envisage a new breed of computer science graduates - competent young women and men with a vision and full of purpose, to innovate and excel, to solve socio-economic problems of Pakistan, make significant contribute towards Pakistan's progress and prosperity. Furthermore, we at FoIT believe in contributing to the local communities and to make a difference. We have been, with the help our students, conducting robotics workshop for local school students. This year we are planning to offer workshops in Machine Learning, Robotics, Computer Vision and Image Processing, providing an opportunity for our students to contribute and make a difference in the education of our youth.

I am sure that our students will prove themselves in all challenging circumstances owing to the rigor and quality of education, a hallmark of FoIT. I invite you to join us on this fascinating and exciting journey, unlock your potential, shrug of the conventional approaches and boldly create new realities and new opportunities for the next generations.



Dr. Muhammad Amjad Iqbal Associate Dean

Faculty of Information Technology (FoIT) is one of the rapidly growing faculties at UCP. FoIT is offering programs in Computer Sciences, Software Engineering and Data Sciences at Undergraduate, Graduate and Postgraduate levels.

Programs being offered by the faculty have been developed to fulfill the requirements of relevant standardization bodies like HEC and NCEAC, while meeting the industry needs. We are providing the best learning experience with state-of-the-art laboratories, classrooms and conducive environment for imparting knowledge. We have highly qualified faculty members graduated from top notch institutes of Pakistan and the world as well. Our faculty has specialized knowledge and skills in diversified disciplines, to prepare students for facing world challenges by imparting most recent knowledge and practical problem solving.

We have been creating new knowledge by emphasizing the research component in the graduate studies and the faculty as well. We are doing research in the Computer Science in variety of domains like, Medical Image Processing, Machine Learning, Networks & Communication, Embedded Systems & Robotics to name a few.

I welcome you all to be part of a vibrant and diversified faculty of Information Technology to brighten up your future and opening horizons of opportunities.

Research Centers at the Faculty of Information Technology

The strength of FoIT is its highly qualified faculty – with specialized training in various fields of Computer Science from renowned universities of USA, Australia, UK, Swe- den, France, Switzerland and Austria – dedicated to produce graduates and researchers with exceptional theoretical and practical skills in the field of Computer Science. The guidance and support extended by the faculty and administration during the entire learning experience of students has produced outstanding professionals, researchers and educators who are providing services in renowned national and international organizations.

Our well-equipped laboratories and state-of-the-art research facilities play a key role in the training and development of IT professionals. To facilitate this process of learning in theoretical and experimental skills, we have project-based as well as generalpurpose laboratories. To facilitate R&D activities, faculty members and students are fully supported by the following research and development centers.

Centre for Learning & Design

By leveraging technology, we can transform the educational landscape of Pakistan and make education more effective, accessible and affordable for all students. With this vision, the Faculty of IT at UCP launched the Center for Learning Design in March 2016. The Center aims to radically change the field of education and revolutionize the methods of imparting education and facilitates students at all levels of educational attainment with special attention paid to developing affordable educational tools and applications using m-learning concepts for students from under-serviced communities. The Centre has been able to developed tools aiding in teaching English language.



To make a meaningful impact on the IT industry, academia, and local communities, the Faculty of IT has launched six centers. These research and development centers are conducting research and developing cutting-edge solutions with the potential to transform the growing field of IT. A productive research is in progress in the areas of Machine Learning, Data Analytics, Health care, Robotics, Embedded Systems, Mathematics, Information Retrieval and Internet of Things. A brief description of these centers is as follows:

Evaluation feedback is the key element in driving the learning methodologies. A Classroom Auto-response system is designed to facilitate early feedback to students for supporting the classroom teaching and evaluation.

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Center for Game Design

The Faculty of IT at UCP has launched Pakistan's first game design center to facilitate students who want to specialize in game design, especially in the EdTech space. This first of its kind center is helping further to diversify the IT industry of Pakistan to enter the global game design market and building linkages between the computer game industry, computer scientists and instruction designers in academia. The primary focus of this Center is on developing educational games and learning applications that provide an immerse experience where learners gain an intuitive understanding of critical building blocks in mathematics, kinematics and language learning. These solutions are currently being refined using feedback from the target user base - students, primarily in grades 6 through 8.

In addition to introducing game design programs at multiple levels of education, the Center aims to conduct research and support entrepreneurs to promote the local game industry. It supports individuals who aspire to become entrepreneurs by providing them with various resources, mentorship and even in developing and marketing their products. The Center provides the perfect platform to students from all disciplines to start their careers in the computer game industry.

Center for Health Care Modeling & Informatics

The Faculty of IT at UCP has initiated state-of-the-art informatics research for improving public health practices across a number of methodological disciplines, particularly Health Informatics, Bioinformatics, Biostatistics, Machine Learning, Computer Vision, Computer Science and Software Engineering. The focus of the research within the Centre is on development of intelligent solutions at undergraduate, graduate and PhD levels to support evidence-based healthcare and to develop methodologies for utilizing Information and Communication Technologies to improve the quality of healthcare.

The Center, hence, provides an e-infrastructure for health research, connecting a rich variety of investigators (clinical, public health and health services, computer scientists and engineers) with relevant analytical and modeling tools and large-scale aggregations of data, to establish broad-range medical applications.

Conseil for Mathematics, Teaching and Research

Major challenge universities around the world face, is poor learning achievement in mathematics courses. The faculty recognizes this fundamental problem and has moved to address it with the establishment of the Centre for Mathematics Teaching and Research, the first of its type in our country. We believe that every student in Pakistan can learn mathematics - appreciate the beauty behind it and use it to solve daily life as well as challenging problems. We find a general disconnect between abstract representations and the range of real-life scenarios that such representations apply to. This is a direct consequence of the prevalent attitude towards teaching and assessment with its focus on formulae, numerical accuracy and correct application of prescribed method.

The Center aims to re-introduce the sheer, joy of learning in a new and incredibly powerful language.

We are thus aligned with David Wheeler's succinct statement of intent; it is "more useful to know how to mathematize than to know a lot of mathematics".

Centre for Robotics & Security

The Center for Robotics & Security focuses on solving real-life challenges and enabling students to hone their skills with hands-on experience. At the Centre, students experiment with land-based and aerial robots, building machines with increasing levels of sophistication, such that the most advanced models, incorporating artificial intelligence, can play football or undertake surveillance tasks. The designing, modeling and controlling methods taught at the Center equip the students with the skill set to enter the industry with confidence.

Recently, the Center has started developing autonomous robots and remotely operated machines to address a wide variety of security challenges. One of the initiatives launched by this Center is to provide a comprehensive security solution to educational institutions. The Center is also running projects to automate agriculture, which is the backbone of the country. Visits by members of the Center to collaborating European research institutes and vice versa are a regular feature of the Center's work.



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Societies

We strongly believe that cocurricular activities play a very important role in the over- all development of our students. To promote this culture, we encourage our students to join professional societies such as Institute of Electrical and Electronics Engineers (IEEE), Association for Computing Machinery (ACM) and Microsoft Student Partner (MSP). These platforms not only connect our students with computing professionals around the world but also serve to showcase their potential. FoIT has organized various seminars and workshops in collaboration with IEEE, ACM and MSP, including sessions on Windows 8 Programming, C#, ASP. net, Drupal CMS, wireless sensor networks, internet protocols and future challenges. In addition, gaming and programming competitions is also a regular feature of faculty activities.

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Department of Computer Science



Dr. Adnan N. Qureshi HoD

HoD's Message

I am distinctly privileged to introduce you to the Department of Computer Science, Faculty of Information Technology at the University of Central Punjab.

The Department of Computer Science, one of the largest in UCP, has made it its mission to nurture computer scientists, researchers and entrepreneurs to enable them to lead the future world of IT and make a significant contribution to problem solving practices. With the support of creative technologies, state-of-the-art infrastructure, computer labs and the research and development centers, our students can become pioneers in the field of robotics, game development, educational technologies, health- care modeling, informatics and other fields of computer science.

Our pride – the members of our Faculty, bring together a blend of novel pedagogical approaches, wide range of expertise, industrial experience and research potential to address technological challenges of 21st century at strategic, tactical and operational levels. Their multifaceted roles endeavor to uphold the sanctity and nobility of the scholarly pursuits that cultivate ethos of curiosity, pragmatism and spirit of teamwork. Our vision is to foster versatility amongst graduates, provide opportunities tailored to their particular strengths and give them the distinct competitive edge with knowledge and skills to make a professional difference both at national and international avenues.

Faculty Members

Dr. Ahmad Shabbar Kazmi

PhD Computer Engineering (Boston University, Massachusetts, USA) MS Computer Engineering (Boston University, Massachusetts, USA) BS Electrical Engineering (University of Engineering & Technology, Lahore) Professor / Dean-Faculty of Information Technology



Dr. Muhammad Amjad Iqbal

PhD Computer Science (FAST-NU, Islamabad) MS Computer Science (FAST-NU, Islamabad) MSc Computer Science (Bahauddin Zakariya University, Multan) Associate Professor / Associate Dean-Faculty of Information Technology

Dr. Adnan Nabeel Qureshi

PhD Computer Science (University of Bedfordshire, Luton, UK) MBIT (Iqra University, Karachi) MCS (University of South Asia, Lahore) MBBS (King Edward College, Lahore) Assistant Professor / HOD-Computer Science Department



Dr. Shahid Saeed Siddiqi

PhD Computational Mathematics (Brunel University, London, UK) MSc Mathematics (University of the Punjab, Lahore) Professor/HOD-Mathematics Department

Mr. Suhyel Umar

M.Phil Iqbaliyat (Allama Iqbal Open University, Pakistan) MA English (Government College University, Lahore) Professor

Dr. Syed Karrar Haider

PhD Physics (University of the Punjab, Lahore) MSc Physics (University of the Punjab, Lahore) Associate Professor/HOD-Humanities & Social Sciences

Dr. Abdul Rauf Nizami

PhD Mathematics (Government College University, Lahore) MSc Mathematics (University of the Punjab, Lahore) Associate Professor

Mr. Shafiq Ur Rahman

MS Computer Science (George Washington University, Washington DC, USA) BS Electrical Engineering (University of Engineering & Technology, Lahore) Associate Professor

Mr. Liaquat Majeed Sheikh

MSc Computer Science (Quaid-e-Azam University, Islamabad) MSc Mathematics (University of the Punjab, Lahore) Associate Professor



Dr. Oumair Naseer PhD Computer Engineeri

PhD Computer Engineering (University Of Warwick, UK) MSc Computer Engineering (LUMS, Lahore) BS Computer Engineering (FAST-NU, Lahore) Assistant Professor

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Dr. Syed Atif Mehdi

PhD Computer Science (University of Kaiserslautern, Germany) MS Computer Science (FAST-NU, Lahore) BS Computer Science (FAST-NU, Lahore) Assistant Professor



Dr. Shahzad Majeed Tiwana

PhD Computer Science (University Of Southern California, Los Angeles, USA) MS in Computer Science (University Of Southern California, Los Angeles, USA) BS Electronics & Software Engineering (National University of Science & Technology, Islamabad) Assistant Professor



Dr. Aamir Shahzad

MS Mathematics (Moscow Institute of Physics & Technology, Moscow, Russia) PhD Electronics Engineering (Beihang University, China) MS Computer Engineering (Lahore University of Management Sciences, Lahore) BEng Electrical Engineering (National University of Science & Technology, Islamabad) Assistant Professor

Dr. Muhammad Umair

PhD Electrical Engineering (ISRA University, Islamabad) MS Electrical Engineering (International Islamic University, Islamabad) BS Computer Science (International Islamic University, Islamabad) Assistant Professor



Dr. Sumaira Sharif

PhD Mathematics (FAST-NU, Lahore) MS Mathematics (FAST-NU, Lahore) MSc Mathematics (Government College University, Lahore) Assistant Professor



Dr. Maria Naseem

PhD Mathematics (Government College University, Lahore) M.Phil Mathematics (Government College University, Lahore) BS Mathematics (Government College University, Lahore) Assistant Professor



Dr. Farhan Dawood

PhD Artificial Intelligence & Robotics (University of Malaya, Kuala Lumpur, Malaysia) MS Electronic Engineering (International Islamic University, Islamabad) BS Electronic Engineering (International Islamic University, Islamabad) Assistant Professor



Dr. Zain Ul Abadin Zafar

PhD Mathematics (University of Engineering & Technology, Lahore) M.Phil Mathematics (University of Engineering & Technology, Lahore) MSc Mathematics (University of the Punjab, Lahore) Assistant Professor

Ms. Maria Zafar

MS Electrical Engineering (FAST-NU, Lahore) MSc Computer Science (Queen Mary University of London, UK) MS Computer Science (Lahore University of Management Sciences, Lahore) Assistant Professor

Mr. Imran Arshad Chaudhry

MS Computer Science (University of Central Punjab, Lahore) BS Computer Science (University of Central Punjab, Lahore) Assistant Professor



Mr. Zaid Munir

Assistant Professor



MS Telecommunication Engineering (National University of Computer and Emerging Sciences) BS Telecommunication Engineering (National University of Computer and Emerging Sciences) Assistant Professor

Mr. Mohsin Abbas

MS Communications Technology (University of Ulm, Germany) BS Telecommunication Engineering (National University of Computer and Emerging Sciences) Assistant Professor

Mr. Faisal Masud Shaikh

MS Electrical (Telecommunication) Engineering (National University of Science & Technology, Islamabad) BS Telecommunication Engineering (University of Engineering & Technology, Lahore) Assistant Professor





Mr. Muhammad Mustafa Hassan

MSc Computer Science (Abo Akademi University, Finland) MSc Computer Science (Government College University, Lahore) PGD Computer Technology & Communication (Government College University, Lahore)



Dr. Adnan Ghafoor

PhD Computer Engineering (International Islamic University, Islamabad) MS Electronic Engineering (International Islamic University, Islamabad) BS Computer Engineering (University of Arid Agriculture, Rawalpindi) Assistant Professor

Mr. Sajid Hussain

MSc Electrical Engineering (System on Chip) (Linköping University, Sweden) BS Computer Engineering (Bahria University, Islamabad) Assistant Professor



Mr. Kamran Shabbir

MS Computer Science (Lahore University of Management Sciences, Lahore) BS Computer Science (Virtual University, Lahore) Assistant Professor



Mr. Saeed Iqbal Khattak

MS Computer Science (National University of Computer and Emerging Sciences) BS Information Technology (University of the Punjab, Lahore) Assistant Professor



Mr. Muhammad Usman Afzal

MS Computer Science (National University of Computer and Emerging Sciences) BS Computer Science (National University of Computer and Emerging Sciences) Assistant Professor

Mr. Awais M. Lodhi

MS Computer Science (National University of Computer and Emerging Sciences) BS Computer Science (National University of Computer and Emerging Sciences) Assistant Professor

Mr. Asad Umar Khan

MSc Physics with Electronics (University of Agriculture, Faisalabad) BSc Mathematics & Physics (Government College University, Lahore) Assistant Professor

Ms. Fareeha Iqbal

MS Computer Science (Capital University of Science & Technology, Islamabad) MSc Computer Science (Quaid-e-Azam University, Islamabad) Principal Lecturer



Mr. Syed Nisar Ali

M.Phil Electronics (Quaid-e-Azam University, Islamabad) MSc Electronics (Quaid-e-Azam University, Islamabad) Senior Lecturer

Mr. Asim Raza

MS Computer Science (University of Central Punjab, Lahore) BS Computer Science (Allama Iqbal Open University, Pakistan) Senior Lecturer

Mr. Ather Suleman

MS Telecommunication & Computer Networks (National University of Science & Technology, Islamabad) BS Computer Engineering (COMSATS Institute of Information Technology, Abbottabad) Senior Lecturer

Mr. Muhammad Irfan Anjum

MSc Electronics (Quaid-e-Azam University, Islamabad) Senior Lecturer

Mr. M. Umsan

Ms. Saba Javed

Lecturer

M.Phil Islamic Studies (University of the Punjab, Lahore) MA Philosophy (University of the Punjab, Lahore) MA Islamic Studies (Jamia Asharfia, Lahore) Lecturer



M.Phil Applied Mathematics (University of the Punjab, Lahore) BA (Hons.) Mathematics (University of the Punjab, Lahore) Lecturer

Ms. Ayesha Zaheer

MS Computer Science (Lahore University of Management Sciences, Lahore) BS Computer Science (National University of Computer and Emerging Sciences) Lecturer





M.Phil Digital Signal Processing (Quaid-e-Azam University, Islamabad)

M.Phil Psychology (Government College University, Lahore) BA (Hons.) Psychology (Forman Christian College University, Lahore)



Mr. Ahmed Abd-e-Muneeb Niazi

MS Electrical Engineering (National University of Computer and Emerging Sciences) BS Electrical Engineering National University of Computer and Emerging Sciences) Lecturer



Mr. Love Kumar

Mr. Suneel Kumar

MS Electrical Engineering (COMSATS Institute of Information Technology, Lahore) BS Electrical (Telecommunication Engineering) (COMSATS Institute of Information Technology, Lahore) Lecturer



Ms. Shaista Siddique

Lecturer

MS Computer Science (National University of Computer and Emerging Sciences) BS Computer Sciences (University of the Punjab, Lahore) Lecturer

MS Electrical Engineering (COMSATS Institute of Information Technology, Lahore)

BS Electrical (COMSATS Institute of Information Technology, Lahore)



Mr. Saad Azhar Saeed

MPhil Computer Science (National University of Computer and Emerging Sciences) BS Information Technology (University of the Punjab, Lahore) Lecturer



Ms. Javaria Arshad

MS Computer Science (National University of Computer and Emerging Sciences) BS Computer Science (National University of Computer and Emerging Sciences) Lecturer



Mr. Saad Ilyas

MS Data Science (University Of Malaya, Malaysia) BS Computer Science (COMSATS Institute of Information Technology, Islamabad) Lecturer

Mr. Syed Irtaza Muzaffar Shah

MS Computer Sciences (University of the Punjab, Lahore) BS Computer Sciences (University of Gujrat, Gujrat) Lecturer



Mr. Amanullah Jiffrey

MS Computer Science, University of Central Punjab, Lahore BSc (Hons.) Computer Science (Lahore University of Management Sciences, Lahore) Lecturer

Mr. Muhammad Ali

MS Electrical Engineering (Lahore University of Management Sciences, Lahore) BSc Electrical Engineering (National University of Computer and Emerging Sciences) Lecturer

Mr. Usman Younas

MS Computer Engineering (Lahore University of Management Sciences, Lahore) BS Computer Engineering (National University of Computer and Emerging Sciences) Lecturer

Mr. Hamad UI Qudous

Lecturer

Mr. M. Waqar Mughal

MS Computer Science (University of Central Punjab, Lahore) BS Computer Science (University of Central Punjab, Lahore) Lecturer

Mr. Muhammad Azeem

MS Computer Science (COMSAT University, Islamabad) BS Computer Science (University of Sargodha, Sargodha) Lecturer

Ms. Sahar Zia



MS Computer Science (COMSATS University, Islamabad) BS Computer Science (COMSATS University, islamabad) Lecturer

Ms. Maryam Badar

MS Computer Science (National University of Sciences & Technology, Islamabad) BS Electrical Engineering (University of Engineering & Technology, Lahore) Associate Lecturer



MS Computer Science (National University of Computer and Emerging Sciences) BS Computer Science (National University of Computer and Emerging Sciences)



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Dr Nauman Mazhar HoD

HoD's Message

Software Engineering is a fascinating field, dealing with software systems and applications that have a profound influence in all spheres of our daily lives. Consequently, the software development market has grown rapidly worldwide and now amounts to billions of dollars of annual transactions. Software Engineering is a discipline that deals with designing and implementing large, reliable, efficient and economical software. It produces specialized individuals equipped with the latest software development techniques, who are able to meet the challenging requirements of developing today's system and application level software. Our Bachelor of Science in Software Engineering pro- gram aims to train our students in various aspects of the software development life cycle. The program has specifically been designed to not only impart theoretical concepts but also expose students to the current industry standards, practices and tools for designing, implementing, developing, testing, deploying and maintaining software systems. Our Software Engineering graduates will learn the most demanding skills to excel in this profession, and proactively play their role in producing relevant knowledge and meeting the software development needs of the industry. The scope of today's software systems extends to numerous sectors including education, health, communications, manufacturing, banking and finance, transportation, infotainment, military, agriculture, and smart communities.

Software Engineering Department has an outstanding faculty, specializing in various fields related to software engineering and computer science. They have teaching and research interests in diversified areas of software engineering, artificial intelligence, robotics, image processing, computer vision, natural language processing, software quality and testing, information retrieval, computer networks & security, and the data science. The course contents are regularly updated to reflect current trends in technology and the need of upcoming research. Our faculty members are also involved in national and international level projects, along with collaborative research with foreign universities and holding joint conferences and workshops.

The BSSE program has been developed to be coherent with the requirements of accreditation bodies (HEC, NCEAC), while meeting the industry standards. It has always been our endeavor to provide a conducive, stimulating and challenging environment to students to nurture and nourish their passion for learning, and enhance their ability to assimilate and discover knowledge. At the same time, it is our aim to groom them as passionate humans with keen sense of social and ethical responsibility to work for the betterment of the society in general. I welcome you all to the Software Engineering Department.



Faculty Members

Dr. Nauman Mazhar

PhD Computer Engineering (University of Engineering and Technology, Taxila) MS Computer Engineering (IOWA State University, USA) BE Avionics Engineering (NED University, Karachi) Associate Professor



Dr. Shahzad Malik Awan

PhD Computer Science (UK) MS Software Engineering (Ireland) MS Computer Sciences (Lahore University of Management Sciences, Lahore) BSc Computer Science (University Of Lahore, Lahore) Associate Professor



Dr. Anam Mustaqeem

PhD Software Engineering (University of Engineering & Technology, Taxila) MS Software Engineering (University of Engineering & Technology, Taxila) BS Software Engineering (University of Engineering & Technology, Taxila) Assistant Professor



Mr. Haroon Abdul Waheed

MSc Advanced Methods in Computer Science (Queen Mary, University of London, UK) MS Computer Science (Lahore University of Management Sciences, Lahore) BS Computer Science (University of Central Punjab, Lahore) Assistant Professor



Ms. Sadaf Baloch

MS Computer Science (Institute of Business Administration, Karachi) BS Software Engineering (Bahria University, Islamabad) Assistant Professor

Ms. Farah Naaz Raza

MS Software Engineering (Sir Syed University of Engineering & Technology, Karachi) BEng Computer Systems (NED University, Karachi) Assistant Professor



Mr. M. Rehan Abbas

MS Computer Engineering (University of Engineering & Technology, Lahore) BS Computer Engineering (University of Engineering & Technology, Lahore) Principal Lecturer



Mr. Waseem Aslam

MS Computer & Communication Security (National University of Science and Technology, Islamabad) MSc Electronics (Quaid-e-Azam University, Islamabad) Senior Lecturer



Mr. Nabeel Ahsan

MS Communication & Signal Processing (Ilmenau University of Technology, Germany) BS Telecommunication (COMSAT Institute of Information Technology, Lahore) Lecturer



Ms. Madiha Yousaf Malik BS Software Engineering (University of Sargodha, Sargodha) Lecturer

Ms. Rubab Javaid

MS Software Engineering (FAST-NU, Lahore) BS Software Engineering (University of Sargodha, Sargodha) Lecturer

Mr. Mohsin Sami

M.Phil Computer Science (University of Central Punjab, Lahore) BS Computer Science (University of Central Punjab, Lahore) Lecturer

Ms. ifrah Qaiser

Lecturer

Mr. Muhammad Bilal Khan

MS Informatics (Umea University, Sweden) BS Computer Engineering (Bahria University, Islambad) Lecturer

Mr. Usman Akber MS Software Engineering (COMSATS University, Islamabad) BS Computer Science (University of Sargodha, Sargodha)

Ms. Syeda Farwa Batool

MS Computer Science (National University of Computer and Emerging Sciences) BS Software Engineering (Punjab University College of Information Technology, Lahore) Lecturer

Ms. Maida Khan

Lecturer

M.Phil Computer Science (University of Punjab, Lahore) BS Software Engineering (University of the Punjab, Lahore) Associate Lecturer

MS Software Engineering (National University of Science & Technology, Islamabad)

MS Software Engineering (National University of Computer and Emerging Sciences) BS Computer Science (National University of Computer and Emerging Sciences)

Department of Computer Science

BS Computer Science

Admission Requirements

- (i) At least 50% marks in F.Sc (Pre-Medical/Pre-Engineering/ ICS/A-Levels or equivalent qualification with Mathematics certified by IBCC.
- (ii) Applicant will clear UCP test or equivalent.

Degree Requirements

Each candidate for the BS Computer Science degree is required to successfully earn 133 Cr. Hrs. with the minimum CGPA of 2.0 on the scale of 4.0 as per the following detail:

	Area		Cr. Hrs.
a)	Core Courses		61
b)	Math Science Foundation Courses		12
c)	Humanities Courses		18
d)	Supporting Courses		09
e)	CS Elective Courses		15
f)	UCP Elective Courses		12
g)	Design Project		06
	7	<i>Fotal</i>	133

a) Core Courses (61 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Computing	CSCS1513	3
Introduction to Computing Lab	CSCS1511	1
Programming Fundamentals	CSCP1013	3
Programming Fundamentals Lab	CSCP1011	1
Object Oriented Programming	CSCP2023	3
Object Oriented Programming Lab	CSCP2021	1
Data Structures and Algorithms	CSCP2033	3
Data Structures and Algorithms Lab	CSCP2031	1
Discrete Structures	CSAL1213	3
Introduction to Database Systems	CSDB2313	3
Introduction to Database Systems Lab	CSDB2311	1
Operating Systems	<i>CSCS3553</i>	3
Operating Systems Lab	CSCS3551	1



Course Title

Software Engineering Computer Communications and Networks Computer Communications and Networks Lab Information Security Digital Logic and Design Digital Logic and Design Lab Computer Organization & Assembly Language Computer Organization & Assembly Lab Language Compiler Construction Design and Analysis of Algorithm Theory of Automata Parallel and Distributed Computing Artificial Intelligence Artificial Intelligence Lab

b) Math Science Foundation Courses (12 Cr. Hrs.)

Course Title
Calculus and Analytical Geometry
Basic Electronics
Probability and Statistics
Linear Algebra

c) Humanities Courses (18 Cr. Hrs.)

Course Title
English Composition & Comprehension
Pakistan Studies
Islamic and Religious Studies
Communication & Presentation Skills
Technical and Business Writing
Professional Practices

d) Supporting Courses (09 Cr. Hrs.)

Course Title	
Supporting I	
Supporting II	
Supporting III	

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Code	Cr. Hrs.
CSSE3113	3
CSNC2413	3
CSNC2411	1
CSNC3413	3
<i>CSCS2523</i>	3
CSCS2521	1
<i>CSCS3543</i>	3
CSCS3541	1
CSCS4573	3
CSAL3233	3
CSAL3253	3
<i>CSCS2543</i>	3
CSAL3243	3
CSAL3241	1

Cr. Hrs.
3
3
3
3

Code	Cr. Hrs.
CSHU1823	3
CSHU1893	3
CSHU1863	3
CSHU1873	3
CSHU2813	3
CSMG4963	3

Code	Cr. Hrs.
СЅҲҲҳҳӼ	3
СЅҲҲҳҳӼЗ	3
CSXXxxx3	3



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Any 03 of the following courses.

Course Title	Code	Cr. Hrs.
Differential Equations	CSSS2763	3
Multivariate Calculus	CSSS2733	3
Numerical Computing	CSAL4263	3
Introduction to Graph Theory	CSAL4293	3
Theory of Programming Languages	CSAL4343	3

e) Computer Science Elective Courses (15 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
CS Elective I	CSXXxxx3	3
CS Elective II	CSXXxxx3	3
CS Elective III	CSXXxxx3	3
CS Elective IV	CSXXxxx3	3
CS Elective V	CSXXxxx3	3

List of Computer Science Electives

Following is a non-exhaustive list of elective courses. New elective courses may be added to this list. Students may be recommended to make their choice of electives, in the light of a soft specialization within the field of Computer science.

Course Title	Code	Cr. Hrs.
Computational Geometry for Designing and Animation	CSAC3613	3
Advanced Machine Learning	CSAL4333	3
Advanced Mobile Development	CSCP3073	3
Advanced Database Systems	CSDS4413	3
Topics in Computer Science	CSAL3273	3
Computer Graphics	CSAL4273	3
Artificial Neural Networks	CSAL4283	3
Introduction to Speech Synthesis	CSAL4313	3
Mobile Application Development	CSCP3063	3
Introduction to Data Mining	CSDB3353	3
Fuzzy Data Mining	CSAL3263	3
3D Computer Graphics	CSAL4323	3
Applied Design Patterns	CSCP4063	3
Web Information Retrieval	CSDB4353	3



Course Title

Introduction to Computation Microprocessor and Interf Database Administration Microprocessor Design Microcontroller Programm Introduction to Image Proc Decision Support Technolo Systems Analysis and Des Introduction to Natural La Object Oriented Analysis Visual Programming Rapid Application Develop System Programming Multimedia Arts Introduction to Computer Data Analysis Techniques Introduction to Data Scien Distributed Database Syst Database Administration Geographical Information Programming for Big Date Data Warehousing Big Data Analytics Digital Signal Processing Data Network Security Data Communication Blockchain Essentials Introduction to Cloud Com Formal Specification of So Software Engineering II User Interface Design and Advanced Web Programm Software Quality Assuran

	Code	Cr. Hrs.
ional Linguistics	CSAL4233	3
facing	CSST3623	3
	CSDB4333	3
	CSST3643	3
ning and Interfacing	CSST3663	3
ocessing	CSAL3203	3
ogies	CSAL4213	3
sign	CSAL4223	3
anguage Processing	CSAL4253	3
and Design	СЅСРЗО2З	3
	CSCP3043	3
oment	СЅСР3053	3
	CSCP4073	3
	CSCP4083	3
Vision	CSDB3263	3
;	CSDB3363	3
nce	CSDB4313	3
tems	CSDB4323	3
	CSDB4333	3
System	CSDB4343	3
a	CSDS4423	3
	CSDS4433	3
	CSDS4473	3
	CSIP3113	3
	CSNC3423	3
	CSNC3433	3
	CSNC3443	3
nputing	CSNC3453	3
oftware	CSSE3123	3
	CSSE3133	3
1 Sketching	CSSE3153	3
ning	CSSE3163	3
nce	CSSE4123	3

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Course Title	Code	Cr. Hrs.
Introduction to Agile and Scrum	CSSE4133	3
Application Development	CSSE4143	3
Web Engineering	CSSE4163	3
Software Testing	CSSE4193	3
Game Modeling	CSST3613	3
Introduction to Game Design	CSST3653	3
Visual Animation	CSST3673	3
FPGA Based System Design	CSST4613	3
Programming Game Engines	CSST4623	3
Technical Game Design	CSST4633	3
Game Algorithms	CSST4643	3
Interactive Multimedia	CSST4653	3
Advanced Game Development	CSST4663	3
Enterprise Resource Planning	CSST4673	3
Embedded System/Microcontroller Programming	CSST4683	3
Introduction to Robotics	CSST4693	3

f) UCP Elective Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
University Elective I	CSXXxxx3	3
University Elective II	CSXXxxx3	3
University Elective III	CSXXxxx3	3
University Elective IV	CSXXxxx3	3

List of University Electives

Course Title	Code	Cr. Hrs.
ntroduction to Psychology	CSHU1843	3
History of Pakistan	CSHU1853	3
Calligraphy	CSHU2823	3
Logic Thinking	CSHU2833	3
Geometry and Design	CSHU2843	3
ntroduction to Sociology	CSHU2863	3
Modern Politics and Government	CSHU2883	3

Course Title
Introduction to Chinese Language
Introduction to Music
Persian Language
Foreign Language
Speak Well - English Conversation
Business Intelligence
Business Mathematics
Management Information System
Principles of Marketing
International Relations
Financial Accounting
Introduction to Business
Business Ethics
Technology Entrepreneurship
Creative Graphics
Introduction to Game Production
The Aesthetic Approach
Human Resource Management
Organizational Behavior and Culture
Fundamentals of Marketing
Management Skills
Urdu Literature
Cultural Anthropology
Iqbaliat
Quranic Arabic
Research Methodology
Entrepreneurship
Introduction to Management

Faculty of Information Technology

Code	Cr. Hrs.
CSHU3833	3
CSHU3843	3
CSHU3853	3
CSHU3863	3
CSHU3873	3
CSHU4873	3
CSIM1113	3
CSIM3113	3
CSIM3123	3
CSMG1913	3
CSMG1923	3
CSMG1933	3
CSMG1943	3
CSMG2913	3
CSMG2923	3
CSMG2933	3
CSMG2943	3
CSMG3933	3
CSMG3943	3
CSMG3953	3
CSMG3963	3
CSMG3973	3
CSMG3983	3
CSMG4923	3
CSMG4933	3
CSMG4973	3
CSMG4983	3
CSMG4993	3

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	bre	al

g) Design Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs. the students are required to demonstrate their practical skills in the field of computer science by designing and implementing a design project worth 06 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Final Year Project I	CSSD4913	3
Final Year Project II	CSSD4923	3

1.3 Community Service (CS4000)

Each student is required to complete 65 hours community work, usually after 4th semester which would be a prerequisite to clear the student for the award of degree.

1.4 Program Duration

This is a four-year degree program comprising of 8 semesters with a minimum of 133 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The minimum and maximum duration to complete BS Computer Science degree is 04 and 07 years, respectively.



Scheme of Studies: BS Computer Science Program

Semester-I (16 C	r. Hrs.)		
Course Code	Course Title	Category	Cr. Hrs.
CSCS1513	Introduction to Computing	Core	3
CSCS1511	Introduction to Computing Lab	Core	1
CSHU2833	Logic Thinking (UCP Elective I)	Uni Elective	3
CSHU1823	English Composition & Comprehension	Humanities	3
CSSS1723	Basic Electronics	Math Science	3
CSHU1863	Islamic and Religious Studies	Humanities	3

Semester-II (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
CSCP1013	Programming Fundamentals	Core	3
CSCP1011	Programming Fundamentals Lab	Core	1
<i>CSCS2523</i>	Digital Logic Design	Core	3
CSCS2521	Digital Logic Design Lab	Core	1
CSSS1713	Calculus and Analytical Geometry	Math Science	3
CSHU1873	Communication & Presentation Skills	Humanities	3
CSHU1893	Pakistan Studies	Humanities	3

Scheme of Studies: BS Computer Science Program

Semester-III (17 Cr. Hrs.)			
Course Code	Course Title	Category	Cr. Hrs.
CSCP2023	Object Oriented Programming	Core	3
CSCP2021	Object Oriented Programming Lab	Core	1
<i>CSCS3543</i>	Computer Org. & Assembly Lang.	Core	3
CSCS3541	Computer Org. & Assembly Lang. Lab	Core	1
CSXXxxx3	Supporting I	Supporting	3
CSAL1213	Discrete Structures	Core	3
CSXXxxx3	UCP Elective II	Uni Elective	3

Semester-IV (17 Cr. Hrs.)		
Course Code	Course Title	
CSSS2743	Probability and Statistics	
CSCP2033	Data Structures and Algorithms	
CSCP2031	Data Structures and Algorithms Lab	
CSDB2313	Introduction to Database Systems	
CSDB2311	Introduction to Database Systems Lab	
CSSS2753	Linear Algebra	
CSXXxxx3	CS Elective I	

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Category	Cr. Hrs.
Math Science	3
Core	3
Core	1
Core	3
Core	1
General Science	3
CS Elective	3

Scheme of Studies: BS Computer Science Program

Semester-V (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
CSSE3113	Software Engineering	Core	3
<i>CSCS3553</i>	Operating Systems	Core	3
CSCS3551	Operating Systems Lab	Core	1
CSXXxxx3	Supporting II	Supporting	3
CSXXxxx3	CS Elective II	CS Elective	3
CSAL3233	Design and Analysis of Algorithms	Core	3

Semester-VI (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
CSAL3253	Theory of Automata	Core	3
CSAL3243	Artificial Intelligence	Core	3
CSAL3241	Artificial Intelligence Lab	Core	1
CSNC2413	Computer Comm. and Networks	Core	3
CSNC2411	Computer Comm. and Networks Lab	Core	1
CSXXxxx3	CS Elective III	CS Elective	3
CSHU2813	Technical and Business Writing	Humanities	3

Semester-VII (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
CSCS4573	Compiler Construction	Core	3
CSNC3413	Information Security	Core	3
CSXXxxx3	Supporting III	Supporting	3
CSXXxxx3	UCP Elective III	Uni Elective	3
CSXXxxx3	CS Elective IV	CS Elective	3
CSSD4913	Final Year Project I	Core	3

Semester-VIII (15 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
CSCS2543	Parallel and Distributed Computing	Core	3
CSMG4963	Professional Practices	Humanities	3
CSXXxxx3	CS Elective V	CS Elective	3
CSXXxxx3	UCP Elective IV	Uni Elective	3
CSSD4923	Final Year Project II	Core	3



Each candidate for the BS Data Science degree is required to successfully earn 133 Cr. Hrs. with the CGPA of 2.0 on a scale of 4.0 as per the following detail:

a) b) c) d) e) f) g)

Course

Introd Introdu Progra Progra Object Object Data S Data S Discret Operat Operat Datab

BS Data Science

Admission Requirements

(i) At least 50% marks in F.Sc (Pre-Medical/Pre-Engineering/ICS/A-Levels or equivalent qualification with Mathematics certified by IBCC.

(ii) Applicant will clear UCP test or equivalent.

Degree Requirements

Area	Cr. Hrs.
Core Courses	61
Math Science Foundation Courses	12
Humanities Courses	18
Supporting Courses	09
DS Elective Courses	15
UCP Elective Courses	12
Design Project	06
Total	133

a) Core Courses (61 Cr. Hrs.)

e Title	Code	Cr. Hrs.
luction to Computing	DSCP1013	3
luction to Computing Lab	DSCP1011	1
amming Fundamentals	DSCP1023	3
amming Fundamentals Lab	DSCP1021	1
t Oriented Programming	DSCP2033	3
t Oriented Programming Lab	DSCP2031	1
Structures & Algorithms	DSCP2043	3
Structures & Algorithms Lab	DSCP2041	3
ete Structures	DSAL2513	1
iting Systems	DSNS3413	3
iting Systems Lab	DSNS3411	1
pase Systems	DSDB2313	3



Course Title	Code	Cr. Hrs.
Database Systems Lab	DSDB2311	1
Software Engineering	DSSD3213	3
Computer Networks	DSNS3423	3
Computer Networks Lab	DSNS3421	1
Information Security	DSNS4433	3
Fundamentals of Data Science	DSDS1113	3
Big Data Programming	DSDS2123	3
Big Data Programming Lab	DSDS2121	1
Data Mining	DSDB3333	3
Data Mining Lab	DSDB3331	1
Artificial Intelligence	DSAL3533	3
Natural Language Processing	DSAL4593	3
Natural Language Processing Lab	DSAL4591	1
Schema-less Databases	DSDB3323	3
Design & Analysis of Algorithms	DSAL3523	3

	b) Math	Science	Foundation	Cours	es (12	Cr. Hrs.)
- 1						

Code	Cr. Hrs.
DSSS1813	3
DSSS2873	3
DSSS2863	3
DSSS1823	3
	Code DSSS1813 DSSS2873 DSSS2863 DSSS1823

c) Humanities Courses (18 Cr. Hrs.)

English Composition & Comprehension	DSHU1633	3
Pakistan Studies	DSHU1613	3
Islamic Studies	DSHU1623	3
Communication & Presentation Skills	DSHU1663	3
Technical and Business Writing	DSHU2673	3
Professional Practices	DSGE4753	3

d) Supporting Courses (09 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Supporting I	DSXXxxx3	3
Supporting II	DSXXxxx3	3
Supporting III	DSXXxxx3	3

For support courses choose any 03 from the following li		
Differential Equations	DSSS2833	3
Introduction to Stochastic Processes	DSSS2843	3
Introduction to Machine Learning	DSAL4583	3
Optimization Techniques	DSDS2133	3
Applied Statistics	DSSS2853	3
Tools and Techniques for Data Science	DSDS2143	3

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e) Data Science Elective Courses (15 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
DS Elective I	DSXXxxx3	3
DS Elective II	DSXXxxx3	3
DS Elective III	DSXXxxx3	3
DS Elective IV	DSXXxxx3	3
DS Elective V	DSXXxxx3	3

List of Data Science Electives

Following is a non-exhaustive list of elective courses. New elective courses may be added to this list. Students may be recommended to make their choice of electives, in the light of a soft specialization within the field of data science.

Course Title	Code	Cr. Hrs.
Image Processing	DSAL3543	3
Computer Vision	DSAL3553	3

Course Title	Code	Cr. Hrs.
Introduction to Biomedical Image Processing	DSAL3563	3
Deep Learning	DSDS3153	3
Generative Adversarial Networks	DSNS3443	3
Deep Reinforcement Learning	DSDS3173	3
Unsupervised Deep Learning	DSDS3183	3
Deep Recurrent Neural Networks	DSDS3193	3
Exploratory Data Analysis and Visualization	DSDS3163	3
Information Retrieval	DSDB3343	3
Bio Informatics	DSSS3883	3
Semantic Web	DSNS3463	3
Business Analytics	DSSS3893	3
Deep Natural Language Processing	DSAL3573	3
Block Chain	DSNS3473	3
Data Modeling & Forecasting	DSSS4813	3
Distributed Computing	DSNS3483	3
Distributed Databases	DSNS4493	3

f) UCP Elective Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
University Elective I	DSXXxxx3	3
University Elective II	DSXXxxx3	3
University Elective III	DSXXxxx3	3
University Elective IV	DSXXxxx3	3



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g) Design Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs. the students are required to demonstrate their practical skills in the field of data science by designing and implementing a design project worth 06 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Final Year Project I	DSSD4913	3
Final Year Project II	DSSD4923	3

Community Service (DS4000)

Each student is required to complete 65 hours community work, usually after 4th semester which would be a prerequisite to clear the student for the award of degree.

Program Duration

This is a four-year degree program comprising of 8 semesters with a minimum of 133 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The minimum and maximum duration to complete BS Data Science degree is 04 and 07 years, respectively.

Scheme of Studies: BS Data Science Program

Semester-I (16 Cr. Hrs.)		
Course Code	Course Title	
DSCP1013	Introduction to Computing	
DSCP1011	Introduction to Computing Lab	
DSHU1643	Logic Thinking (UCP Elective I)	
DSHU1633	English Composition & Comprehension	
DSSS1823	Basic Electronics	
DSHU1613	Pakistan Studies	

Semester-II (16 Cr. Hrs.)

Course Code	Course Title
DSCP1023	Programming Fundamentals
DSCP1021	Programming Fundamentals Lab
DSDS1113	Fundamentals of Data Science
DSSS1813	Calculus and Analytical Geometry
DSHU1663	Communication & Presentation Skills
DSHU1623	Islamic Studies

Semester-III (17 Cr. Hrs.)

Course Code	Course Title
DSCP2033	Object Oriented Programming
DSCP2031	Object Oriented Programming Lab
DSDS2123	Big Data Programming
DSDS2121	Big Data Programming Lab
DSXXxxx3	Supporting I
DSAL2513	Discrete Structures
DSXXxxx3	UCP Elective II

Semester-IV (17 Cr. Hrs.)		
Course Code	Course Title	
DSSS2863	Probability and Statistics	
DSCP2043	Data Structures and Algorithms	
DSCP2041	Data Structures and Algorithms Lab	
DSDB2313	Introduction to Database Systems	
DSDB2311	Introduction to Database Systems Lab	
DSSS2873	Linear Algebra	
DSHU2673	Technical and Business Writing	

Category	Cr. Hrs.
Core	3
Core	1
Uni Elective	3
Humanities	3
Math Science	3
Humanities	3

Category	Cr. Hrs.
Core	3
Core	1
Core	3
Math Science	3
Humanities	3
Humanities	3

Category	Cr. Hrs.
Core	3
Core	1
Core	3
Core	1
Supporting	3
Core	3
Uni Elective	3

Category	Cr. Hrs.
Math Science	3
Core	3
Core	1
Core	3
Core	1
Math Science	3
Humanities	3

Scheme of Studies: BS Data Science Program

Semester-V (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
DSDB3323	Schema-less Databases	Core	3
DSNS3413	Operating Systems	Core	3
DSNS3411	Operating Systems Lab	Core	1
DSXXxxx3	Supporting II	Supporting	3
DSXXxxx3	DS Elective I	DS Elective	3
DSAL3533	Design and Analysis of Algorithms	Core	3

Semester-VI (17 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
DSDB3333	Data Mining	Core	3
DSDB3331	Data Mining Lab	Core	1
DSAL3533	Artificial Intelligence	Core	3
DSNS3423	Computer Comm. and Networks	Core	3
DSNS3421	Computer Comm. and Networks Lab	Core	1
DSXXxxx3	DS Elective II	DS Elective	3
DSSD3213	Software Engineering	Core	3

Scheme of Studies: BS Data Science Program

Semester-VII (1	8 Cr. Hrs.)		
Course Code	Course Title	Category	Cr. Hrs.
DSGE4753	Professional Practices	Humanities	3
DSXXxxx3	Supporting I	Supporting	3
DSXXxxx3	UCP Elective III	Uni Elective	3
DSXXxxx3	DS Elective III	DS Elective	3
DSXXxxx3	DS Elective IV	DS Elective	3
DSSD4913	Final Year Project I	Core	3

Semester-VIII (16 Cr. Hrs.)

Course Code	Course Title
DSAL4593	Natural Language Processing
DSAL4591	Natural Language Processing Lab
DSNS4433	Information Security
DSXXxxx3	DS Elective V
DSXXxxx3	UCP Elective IV
DSSD4923	Final Year Project II



Category	Cr. Hrs.
Core	3
Core	1
Core	3
DS Elective	3
Uni Elective	3
Core	3

MS Computer Science

Admission Requirements

- (i) A minimum of 16 years of education leading to BS in Computer Science/Information Technology/Software Engineering or equivalent
- (ii) Pre-requisite courses will be determined as per HEC policy (if any)
- (iii) Minimum 2.00/4.00 CGPA or 50% marks
- (iv) Admission Test/HEC Approved Test

Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs course work with 6 Cr. Hrs Thesis
- (ii) Course work only (10 Courses)

Each candidate for the MS Computer Science degree is required to successfully earn 30 Cr. Hrs. with the CGPA 2.5 on a scale of 4.0 as per the following detail:

	Area	Cr. Hrs.
a)	Core Courses	12
b)	Electives	12
с)	Thesis/Additional Courses	06
	Total	30

a) Core Courses

Course Title	Code	Cr. Hrs.
Advanced Algorithms Analysis	CSAC5613	3
Advanced Theory of Computation	<i>CSSC5333</i>	3
Advanced Computer Architecture	CSNS5523	3
Advanced Operating Systems	CSNS5513	3
Theory of Programming Languages	<i>CSSC5343</i>	3

b) Electives (12 Cr. Hrs.)

Following is a non-exhaustive list of elective courses. New elective courses may be added to this list. Students may be recommended to make their choice of electives, in the light of a soft specialization within the field of Computer science.



Course Title	Code	Cr. Hrs
Topics in Artificial Intelligence	CSAC5643	3
Topics in Computer Vision	CSIP6163	3
Topics in Information Retrieval	CSDS7433	3
Topics in Networks & Communication	CSNS6553	3
Topics in Embedded Systems	CSNS6543	3
Advanced Software Engineering	CSSE5013	3
Software Quality Assurance	CSSE5123	3
Requirements Engineering	CSSE5033	3
Formal Methods	CSSE5043	3
Formal Specification and Design Techniques	CSSE5053	3
Digital Image Processing	CSIP5123	3
Digital Signal Processing	CSIP5113	3
Computational Intelligence	<i>CSCI7233</i>	3
Fuzzy Intelligence	CSCI5213	3
Machine Learning	CSCI5223	3
Parallel Computing	<i>CSSC5313</i>	3
Distributed Systems	<i>CSSC5323</i>	3
Theory of Programming Languages	<i>CSSC5343</i>	3
Advanced Database Systems	CSDS5413	3
Data Mining	CSDS5423	3
Data Warehousing	CSDS6443	3
Information Retrieval Techniques	CSDS5443	3
Mobile Communication Systems	CSNS5533	3
Network Security	CSNC5423	3
Multimedia Systems	CSSE5533	3
Algorithmic Graph Theory	CSAC5623	3
Software Project Management	CSSE6063	3
Computer Vision	CSIP6133	3
Robotics	CSIP6143	3
Pattern Recognition	CSCI6243	3
Fuzzy Automata and Languages	<i>CSSC6353</i>	3
Advanced Compiler Techniques	<i>CSSC6363</i>	3

Course Title	Code	Cr. Hrs.
Advanced Data Mining	CSDS6453	3
Multimedia Database Systems	CSDS6463	3
Advanced Computer Networks	CSNS6563	3
Systems Modeling and Simulation	CSAC6633	3
Dynamic Modeling and Algorithms	CSAC6643	3
Operations Research-I	<i>CSSC6373</i>	3
Natural Language Processing	CSCI6233	3
Stochastic Processes	CSAC6653	3
Genetic Algorithms	CSAC6663	3
Operations Research-II	<i>CSSC7383</i>	3
Distributed Knowledge Engineering	CSCI7253	3
Advanced Topics in Formal Methods	CSSE5063	3
Real Time Systems	CSNS7573	3
Wireless Networks	CSNS7583	3
Geometric Modelling for Curve Designing	CSAC6673	3
Biomedical Signal and Image Processing	CSIP6153	3
Topics in Statistical Natural Language Processing	CSCI6253	3
Information Retrieval and Web Search Engine	CSDS5483	3
Design of Interactive Learning Applications	CSSE7023	3
Mobile Robotics	CSST5693	3
Research Methodology	CSST5663	3
c) Research Thesis		

Research Thesis	<i>CSRW6916</i>	6
Thesis Continuation	CSRW6921	1

Program Duration

This is nominally a two-year degree program comprising of 4 semesters with a minimum of 30 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for deficiency courses. The maximum duration to complete MS Computer Science degree is 04 years.

MS Data Science

Admission Requirements

- (i) A minimum of 16 years of education leading to BS in Computer Science/Information Technology/Software Engineering or equivalent
- (ii) Pre-requisite courses will be determined as per HEC policy (if any)
- (iii) Minimum 2.00/4.00 CGPA or 50% marks (iv) Admission Test/HEC Approved Test

Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

- (i) 24 Cr. Hrs course work with 6 Cr. Hrs Thesis
- (ii) Course work only (10 Courses)

Each candidate for the MS Data Science degree is required to successfully earn 30 Cr. Hrs. with the CGPA of 2.5 on the scale of 4.0 as per the following detail:

	Area		Cr. Hrs.
a)	Core Courses		12
b)	Specialization		06
с)	Electives		06
d)	Thesis/Additional Courses		06
		Total	30

a) Core Courses

Course Title	Code	Cr. Hrs.
Statistical and Mathematical Methods for Data Science	DSSM5103	3
Tools and Techniques in Data Science	DSDS5203	3
Machine Learning	DSAI5303	3
Research Methodology	DSRM5401	3

b) Specialization Courses

Select any O2 courses out of following:

Course Title	Code	Cr. Hrs.
Big Data Analytics	DSDS5213	3
Deep Learning	DSAI6313	3
Natural Language Processing	DSAI6323	3
Distributed Data Processing	DSDS6233	3

c) Electives

Following is a non-exhaustive list of elective courses. New elective courses may be added to this list. Students may be recommended to make their choice of electives, in the light of a soft specialization within the field of data science.



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Course Title	Code	Cr. Hrs.
Topics in Artificial Intelligence	DSAI5643	3
Topics in Data Visualization	DSIP6163	3
Topics in Data & Information Retrieval	DSDS7433	3
Topics in Networks & Communication	DSNS6553	3
Topics in Cloud Computing Technologies	DSNS6543	3
Advanced Computer Vision	DSIP5603	3
Algorithmic Trading	DSCS5503	3
Bayesian Data Analysis	DSDS5233	3
Big Data Analytics	DSDS5243	3
Bioinformatics	DSCS5513	3
Cloud Computing	DSCS5523	3
Computational Genomics	DSSM6153	3
Data Visualization	DSDS6253	3
Deep Reinforcement Learning	DSAI6333	3
Distributed Data Processing and Machine Learning	DSDS6263	3
Distributed Machine Learning in Apache Spark	DSAI6343	3



Course Title	Code	Cr. Hrs.
High Performance Computing	DSCS5533	3
Inference & Representation	DSDS6273	3
Optimization Methods for Data Science and Machine Learning	DSSM5113	3

d) Research Thesis

Course Title	Code	Cr. Hrs.
Research Thesis	DSRW6916	6
Thesis Continuation	DSRW6921	1

Program Duration

This is a two-year degree program comprising of 4 semesters with 30 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for deficiency courses. The maximum duration to complete MS Data Science degree is 04 years.

PhD Computer Science

2:12 Thursday, April 11

The Department provides a vibrant and dynamic environment (i) that encourages excellence in research specifically in the (ii) *Comprehensive Examination (written and oral)* areas of Software Systems & Engineering, Multimedia (iii) 30 Cr. Hrs. Research Work & Communications, Web and Information Systems and (iv) Synopsis Defense Computational Business Intelligence. The PhD program aims Dissertation Foreign Reviews (v) at producing graduates who could meet the challenges (vi) Publication of at least one research paper in HEC of emerging international trends in Computer Science. To approved journal. achieve this objective, we have a team of highly qualified and (vii) Dissertation Final Defense dedicated faculty members; a cohesive and carefully designed *Note:* PhD scholars are required to comply with the following PhD program. A due emphasis has been placed on the applied timeline: and industrial aspects of the research. For this purpose, the Department has established a strong liaison with Research & Development organizations and industry.

Admission Requirements

- (i) MS degree in relevant discipline
- Minimum CGPA 3.0/4.0 (Semester System) or 60% (ii) marks (Annual System)
- Admission Test/GAT Subject/HEC Test (iii)
- (iv) Interview

Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:



- 18 Cr. Hrs. Course Work with minimum CGPA 3.00/4.00

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	4 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	14 Semesters (7 Years)

Department of Software Engineering

BS Software Engineering

Admission Requirements

- (i) At least 50% marks in F.Sc (Pre-Medical/Pre-Engineering/ICS/A-Levels or equivalent qualification with Mathematics certified by IBCC.
- (ii) Applicant will clear UCP test or equivalent.

Degree Requirements

Each candidate for the BS Software Engineering degree is required to

Course Title

successfully earn 133 Cr. Hrs. with the minimum CGPA of 2.0 on the scale of 4.0 as per the following detail:

Code Cr Hrs

	Area		Cr. Hrs.
a)	Core Courses		61
b)	Math Science Foundation Courses		12
с)	Humanities Courses		18
d)	Supporting Courses		09
e)	SE Elective Courses		15
f)	University Elective Courses		12
g)	Design Project		06
		Total	133

a) Core Courses (61 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
Introduction to Computing	SECP1013	3
Introduction to Computing Lab	SECP1011	1

		<i>ci. i ii 5.</i>
Programming Fundamentals	SECP1023	3
Programming Fundamentals Lab	SECP1021	1
Object Oriented Programming	SECP2033	3
Object Oriented Programming Lab	SECP2031	1
Data Structures and Algorithms	SECP2043	3
Data Structures and Algorithms Lab	SECP2041	1
Discrete Structures	SEAD1413	3
Introduction to Database Systems	SEAD3423	3
Introduction to Database Systems Lab	SEAD3421	1
Operating Systems	SENS3513	3



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Operating Systems Lab
Software Engineering
Computer Communications and Networks
Computer Communications and Networks Lab
Information Security
Human Computer Interaction
Software Requirements Engineering
Software Design and Architecture
Software Construction and Development
Software Quality Engineering
Software Project Management
Software Re-engineering
Web Engineering

b) Math Science Foundation Courses (12 Cr. Hrs.)

Course Title
Calculus and Analytical Geometry
Basic Electronics
Linear Algebra
Probability and Statistics

c) Humanities Courses (18 Cr. Hrs.)

Course Title
English Composition & Comprehension
Pakistan Studies
Islamic and Religious Studies
Communication & Presentation Skills
Technical and Business Writing
Professional Practices

d) Supporting Courses (09 Cr. Hrs.)

Course Title	
Supporting I	
Supporting II	
Supporting III	

Code	Cr. Hrs.
SENS3511	1
SESE1113	3
SENS3523	3
SENS3521	1
SENS4533	3
SESE2123	3
SESD2213	3
SESD2223	3
SESD3243	3
SESM3313	3
SESM4323	3
SESE4143	3
SESD3233	3

Cr. Hrs.
3
3
3
3

Code	Cr. Hrs.
SEHU1833	3
SEHU1813	3
SEHU1823	3
SEHU1863	3
SEHU2873	3
SEGE3953	3

Code	Cr. Hrs.
SEZZzzz3	3
SEZZzzz3	3
SEZZzzz3	3



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Any 03 of the following courses.

Course Title	Code	Cr. Hrs.
Business Process Engineering	SEST2613	3
Formal Methods in Software Engineering	SESE3133	3
Operations Research	SESS3763	3
Simulation and Modeling	SESD4263	3
Stochastic Processes	SESS3753	3

e) Software Engineering Elective Courses (15 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
SE Elective I	SEZZzzz3	3
SE Elective II	SEZZzzz3	3
SE Elective III	SEZZzzz3	3
SE Elective IV	SEZZzzz3	3
SE Elective V	SEZZzzz3	3

(List of Software Engineering Elective Courses)

Following list is non-exhaustive.

Course Title	Code	Cr. Hrs.
Object Oriented Software Engineering	SESE4153	3
Web Application Development	SECP4063	3
Software Configuration Management	SESM4333	3
Software Development Risk Analysis	SESM4343	3
Artificial Intelligence	SEAD3433	3
Mobile Application Development	SECP3053	3
Data Science	SEAD3443	3
Multimedia Communication	SENS4543	3
Global Software Development	SEST4623	3
Game Application Development	SEST4633	3
Design Patterns	SEST4653	3
Computer Graphics	SEST3663	3
Software Analysis and Design	SESD4273	3
Semantic Web	SEST4643	3
Cloud Computing	SEST3673	3
Software Testing	SESD3253	3
Software Quality Assurance	SESM3363	3
Machine Learning	SEAD3453	3
Big Data Programming	SECP4073	3



f) University Elective Courses (12 Cr. Hrs.)

Course Title	Code	Cr. Hrs.
UCP Elective I	SEZZzzz3	3
UCP Elective II	SEZZzzz3	3
UCP Elective III	SEZZzzz3	3
UCP Elective IV	SEZZzzz3	3
(List of University Electives Courses)		

Following list is non-exhaustive. Course Title Introduction to Psycholog

Foreign Language Introduction to Business Introduction to Game Prod Technical Entrepreneurshi Creative Graphics Fundamentals of Marketi Human Resource Manage

g) Design Project (06 Cr. Hrs.)

After the completion of 90 Cr. Hrs. the students are required to demonstrate their practical skills in the field of software engineering by designing and implementing a design project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title

Final Year Project I Final Year Project II

Community Service (SE4000)

Each student is required to complete 65 hours community work, usually after 4th semester which would be a prerequisite to clear the student for the award of degree.

Program Duration

This is a four-year degree program comprising of 8 semesters with a minimum of 133 Cr. Hrs. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The minimum and maximum duration to complete BS Software Engineering degree is 04 and 07 years, respectively.

	Code	Cr. Hrs.
<i>IV</i>	SEHU1843	3
	SEHU1853	3
	SEGE1913	3
duction	SEGE2923	3
ip	SEGE2933	3
	SEGE3943	3
ing	SEGE3963	3
ement	SEGE1923	3

Code	Cr. Hrs.
SESD4913	3
SESD4923	3

Scheme of Studies: BS Software Engineering Program

Semester-I (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
SECP1013	Introduction to Computing	Core	3
SECP1011	Introduction to Computing Lab	Core	1
SEHU1833	English Composition & Comprehension	Humanities	3
SESS1713	Calculus and Analytical Geometry	Math Science	3
SESS1723	Basic Electronics	Math Science	3
SEHU1813	Pakistan Studies	Humanities	3

Semester-II (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
SECP1023	Programming Fundamentals	Core	3
SECP1021	Programming Fundamentals Lab	Core	1
SEHU1863	Communication & Presentation Skills	Humanities	3
SEAD1413	Discrete Structures	Core	3
SESE1113	Software Engineering	Core	3
SEHU1823	Islamic and Religious Studies	Humanities	3

Semester-III (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
SECP2033	Object Oriented Programming	Core	3
SECP2031	Object Oriented Programming Lab	Core	1
SESD2213	Software Requirements Engineering	Core	3
SESE2123	Human Computer Interaction	Core	3
SESS2743	Linear Algebra	Math Science	3
SEZZzzz3	UCP Elective I	Uni Elective	3

Semester-IV (16 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
SECP2043	Data Structures and Algorithms	Core	3
SECP2041	Data Structures and Algorithms Lab	Core	1
SESD2223	Software Design and Architecture	Core	3
SESS2733	Probability and Statistics Math Science	3	
SEZZzzz3	Supporting I	Supporting	3
SEHU2873	Technical and Business Writing	Humanities	3

Scheme of Studies: BS Software Engineering Program

Semester-V (17	Cr. Hrs.)		
Course Code	Course Title	Category	Cr. Hrs.
SENS3513	Operating Systems	Core	3
SENS3511	Operating Systems Lab	Core	1
SEAD3423	Introduction to Database Systems	Core	3
SEAD3421	Introduction to Database Systems Lab	Core	1
SESD3233	Web Engineering	Core	3
SEZZzzz3	UCP Elective II	Uni Elective	3
SEZZzzz3	Supporting II	Supporting	3

Semester-VI (19 Cr. Hrs.)			
Course Code	Course Title		
SESM3313	Software Quality Engineering		
SENS3523	Computer Comm. and Networks		
SENS3521	Computer Comm. and Networks Lab		
SEGE3953	Professional Practices		
SESD3243	Software Construction and Development		
SEZZzzz3	SE Elective I		
SEZZzzz3	Supporting III		

Semester-VII (18 Cr. Hrs.)

Course Code	Course Title	Category	Cr. Hrs.
SENS4533	Information Security	Core	3
SESM4323	Software Project Management	Core	3
SESE4143	Software Re-engineering	Core	3
SEZZzzz3	SE Elective II	SE Elective	3
SEZZzzz3	SE Elective III	SE Elective	3
SESD4913	Final Year Project I	Core	3

Semester-VIII (15 Cr. Hrs.)Course CodeCourse TitleSEZZzzz3SE Elective IVSEZZzzz3SE Elective VSEZZzz23UCP Elective IIISEZZzz3UCP Elective IVSEZZzz3Final Year Project II

Category	Cr. Hrs.
Core	3
Core	3
Core	1
Humanities	3
Core	3
SE Elective	3
Supporting	3

Category	Cr. Hrs.
SE Elective	3
SE Elective	3
Uni Elective	3
Uni Elective	3
Core	3