

College of Science and Engineering

Prospectus 2023/2024

كلية العلوم والهندسة
College of Science & Engineering

جامعة حمد بن خليفة
HAMAD BIN KHALIFA UNIVERSITY

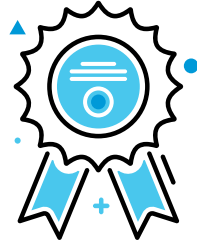


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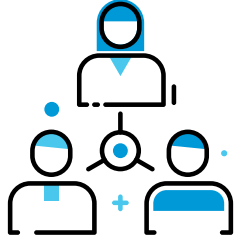
The background features a large, abstract geometric design. On the left, a dark blue triangle points towards the center. To its right, a light blue triangle points towards the top-left corner. The remaining area on the right is a solid medium blue. The text 'About HBKU' is centered in the medium blue area.

About HBKU



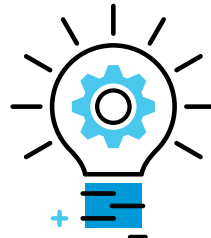
Excellence

Recognition of Quality
through Excellence



People

Shaping Society



Innovation

Leading Transformation



Partners

Success through Synergy

About HBKU

Innovating Today, Shaping Tomorrow

Hamad Bin Khalifa University (HBKU), a member of Qatar Foundation for Education, Science, and Community Development (QF), was founded in 2010 to continue fulfilling QF's vision of unlocking human potential.

HBKU is a homegrown research and graduate studies university that acts as a catalyst for positive transformation in Qatar and the region while having a global impact.

Located within Education City, HBKU seeks to provide unparalleled opportunities where inquiry and discovery are integral to teaching and learning at all levels, utilizing a multidisciplinary approach across its focus areas.

The university provides an array of graduate programs through its College of Islamic Studies, College of Humanities and Social Sciences, College of Science and Engineering, College of Law, College of Health and Life Sciences, and College of Public Policy.

HBKU is also home to three research institutes – Qatar Biomedical Research Institute (QBRI), Qatar Computing Research Institute (QCRI), and Qatar Environment and Energy Research Institute (QEERI) – which together with the colleges are at the forefront of efforts to seek novel solutions to grand challenges facing Qatar and the region.

Additionally, HBKU's Executive Education Center delivers customized programs for the business community of Qatar and the region.



Why Study at HBKU?

“As a student at HBKU, you have the opportunity to play a key role at an institution which, at its heart, is committed to innovating today and shaping tomorrow.”

At Hamad Bin Khalifa University, our people are our greatest strength, and when students enroll in one of our academic programs, they become part of a thriving community that is committed to the pursuit of excellence and innovation. HBKU has a mandate to build and cultivate human capacity by offering students an enriching academic experience that extends beyond the classroom. By utilizing unique collaborations with local and international partners, we aim to tackle the challenges of the region and the world through interdisciplinary education and innovative research.

HBKU is proud to offer students the opportunity to learn from world-renowned faculty and industry leaders through our colleges and our three national research institutes, providing the knowledge, skills and experience necessary to become experts in

their chosen fields, and take their careers to the next level. HBKU is situated in a regional economic and cultural hub, and our students benefit greatly from exposure to diverse perspectives as they determine how to use their degrees to positively contribute to their own development and that of their communities, whether in Qatar or across the world.

Additionally, HBKU benefits from an exceptional student-to-faculty ratio and from being based in Education City – a unique hub of learning that offers students a wealth of opportunities to play an active role in a vibrant multicultural environment.

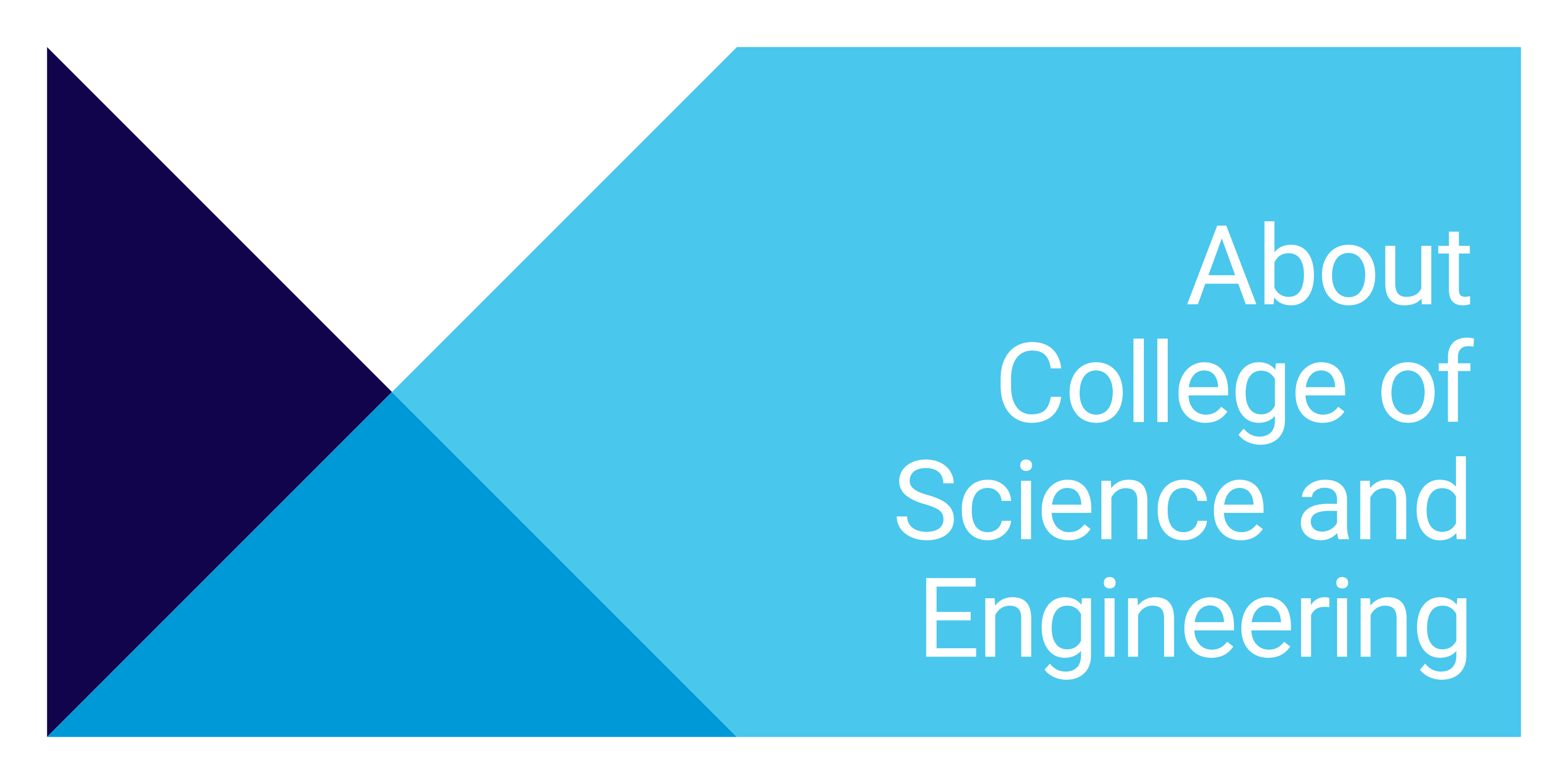
As a student at HBKU, you have the opportunity to play a key role at an institution that, at its heart, is committed to innovating today and shaping tomorrow.

Research

Research is the cornerstone of Hamad Bin Khalifa University's commitment to building human capacity through interdisciplinary education and innovation that supports Qatar's journey towards sustainable growth. HBKU's interdisciplinary research and education environment is distinguished by a unique synergy among the colleges and research institutes.

The university's students, faculty, and researchers work within an ecosystem that addresses challenges of national priority and contributes to outcomes with a tangible impact on society. Collectively, they are achieving breakthroughs in the fields of biomedicine, genomics and precision medicine, information and communications technology and sustainability, while advancing knowledge across the humanities, Islamic studies, law, and public policy.

At each of the six colleges, students work under the guidance of faculty to conduct research that results in tangible solutions and innovative outcomes.



About College of Science and Engineering



College Overview

The College of Science and Engineering (CSE) offers the largest selection of programs within the university. All of its programs involve collaboration with HBKU's prestigious research institutes, utilizing the skills of expert scientists, and with external world-renowned academics and industrial partners strengthening the link between education and societal and economic needs and maximizing students' employability.

Divisions

CSE is home to:

- ▶ Division of Engineering Management and Decision Sciences
- ▶ Division of Sustainable Development
- ▶ Division of Information and Computing Technology

The divisions are firmly committed to excellence in graduate teaching and the training of highly qualified students in cutting-edge areas of knowledge across multiple disciplines. CSE faculty are internationally recognized in pursuing high-impact research addressing societal and economic needs in Qatar and globally.



Students and Alumni

Division of Information and Computing Technology

The division's programs attract students with a strong academic background and who are ambitious, innovative and of high caliber. Those who are actively pursuing a master's degree within the division have a solid background in computer science, computer engineering, electrical engineering, information systems, or related health fields. Applicants seeking admission should demonstrate strong evidence that they possess the qualities to become successful researchers, industry professionals and innovators. Experience in the healthcare sector is preferred for applicants to the Master of Data Analytics (MDA) in Health Management and the Master of Information Systems in Health Management. Students enrolled in the PhD programs are also required to have strong academic and vocational experience.

Graduates in the Information and Computing Technology Division may choose to:

- ▶ Advance their academic career through pursuing higher degrees or seeking academic positions at reputable universities.
- ▶ Become research scientists, data analysts, cybersecurity professionals, or software engineers at leading, international research labs.
- ▶ Engage in technology start-ups as CTOs, CIOs, or CEOs.
- ▶ Pursue career paths in the IT sector, industries linked to data analytics, cybersecurity, health informatics and management, as well as research centers.

Division of Engineering Management and Decision Sciences (EMDS)

The EMDS division is at the core of engineering, business, and data analytics. The graduate programs within the EMDS are multidisciplinary programs that expose students to innovative decision-making methodologies and technologies that are influencing our everyday life. The objective of these programs is to attract diverse and outstanding students from Qatar, the region and the world to develop cutting edge research.

Graduates of the EMDS may choose to pursue careers in:

- ▶ Academia and education
- ▶ Research institutes or startups
- ▶ Logistics and supply chain industries
- ▶ Ministries and governmental agencies
Oil and gas, manufacturing, transportation, or cargo
- ▶ Sports related companies and industries

Division of Sustainable Development

The Division of Sustainable Development offers four different programs with rigorous and highly selective admissions criteria. The division actively seeks top students in Qatar and the region, with academic backgrounds that are as diverse as their nationalities.

Graduates of the Division of Sustainable Development may choose to pursue careers in various sectors such as:

- ▶ Academia and education
- ▶ Ministries
- ▶ International agencies
- ▶ Think-tanks
- ▶ Finance, investment and banking
- ▶ Healthcare sector
- ▶ Energy
- ▶ Utilities (water, gas, electricity)
- ▶ Oil and gas
- ▶ Manufacturing
- ▶ Transportation
- ▶ Airline
- ▶ Automotive
- ▶ Consultancy



Faculty and Research Areas

Division of Information and Computing Technology

Faculty in CSE's Division of Information and Computing Technology are involved in innovative research that seeks to address pressing issues in Qatar and the region. Additionally, they conduct large-scale research projects that drive significant contributions at an international level.

Faculty conduct research on:

- ▶ Big data analytics and machine learning
- ▶ Artificial intelligence
- ▶ Computer vision
- ▶ Signal and image processing
- ▶ Cybersecurity, data privacy, and cyber-physical systems

- ▶ Secure data management, applied cryptography, and blockchain
- ▶ Next generation wireless networks and mobile computing
- ▶ Human-computer interaction
- ▶ Sensors, biomedical circuits, and very-large-scale integration (VLSI)
- ▶ Social computing and multimedia
- ▶ Quantum computing
- ▶ Scientific visualization and visual computing
- ▶ Computational bioinformatics
- ▶ Digital health/Health informatics
- ▶ Software engineering
- ▶ Technology and human behavior

Division of Engineering Management and Decision Sciences (EMDS)

The division of EMDS is home to the MSc/PhD in Logistics and Supply Chain Management and the MSc in Sports and Entertainment Management (joint program with the University of South Carolina). It is a multi-disciplinary unit designed to progress the interaction between humans, machines, management systems, infrastructure, and the global environment. In addition to its excellence in its core programs, one of the strengths of the EMDS division is its multidisciplinary research and teaching methods, which can cut across CSE programs within the Division of Information and Computing Technology and the Division of Sustainable Development. The mission of the EMDS division is to develop core expertise in engineering and business decision-making processes dealing with products, services, transportation, information, and cash

flows within sports, entertainment, logistics and supply chain management. The EMDS Division is a catalyst for new research streams, which involves big data, AI, manufacturing and operations research. The creation of multidisciplinary teams is a major focus, allowing the division to attract the necessary resources to maintain and build the requisite technologies to support its research goals. Through collaborations, the technologies and expertise within the division benefit a wide range of research themes within HBKU. Strong industry and academia collaboration is a key driver for the division where research development at HBKU finds a home within industry. The division's faculty are internationally recognized and pursue high-impact research in multiple areas related to sports, logistics, supply chain management, financial modelling, green supply chains and logistics, and manufacturing.

Division of Sustainable Development

CSE's Division of Sustainable Development is home to world-renowned faculty, who are experts in their respective fields. Working collectively, they actively pursue research in areas that are becoming exceedingly critical for national and regional progression.

Faculty of the Sustainable Development Division are involved in:

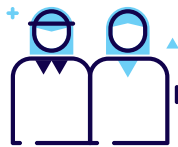
- ▶ Renewable energy technologies and policies
- ▶ Smart power grids
- ▶ Oil and gas technology and economics
- ▶ Energy-water-food nexus
- ▶ Desalination, water treatment and water reuse
- ▶ Environmental biotechnology
- ▶ Air quality
- ▶ Green buildings and sustainable urban planning
- ▶ Energy and resource efficiency
- ▶ Demand-side management, social behavior change, progressive policy-making and cultural contexts
- ▶ Sustainable economy and financing
- ▶ Biomass and waste management
- ▶ Nano-technology, nano-materials and nano-manufacturing
- ▶ Computational simulation of systems, materials, and fluids

At a Glance



13 Programs

- PhD in Computer Science and Engineering
- PhD in Logistics and Supply Chain Management
- PhD in Sustainable Energy
- PhD in Sustainable Environment
- Master of Data Analytics in Health Management
- Master of Information Systems in Health Management
- Master of Science in Cybersecurity
- Master of Science in Data Science and Engineering
- Master of Science in Logistics and Supply Chain Management
- Master of Science in Sport and Entertainment Management
- Master of Science in Sustainable Energy
- Master of Science in Sustainable Environment
- Bachelor of Science in Computer Engineering



412 Students

Qatari Students (24%)



70 Nationalities

across HBKU



436 Alumni



Programs

Division of Information and Computing Technology

PhD in Computer Science and Engineering

CSE's PhD program in Computer Science and Engineering provides students with a solid, fundamental and advanced education, as well as strong research experience and a broad understanding of aspects related to computer science and engineering that will translate into exciting, challenging, and well-compensated job opportunities in this high-demand field.

The program aims to equip students with up-to-date knowledge of computer science and engineering, as well as the methods, tools, and technologies needed to explore this rapidly evolving field.

The program provides a broad, multidisciplinary and research-intensive education at the boundary of computer science and engineering, while providing specialization streams in contemporary fields that are globally important and relevant to Qatar. These fields include systems and computer security, software engineering, computational sciences, computer systems, architecture and very-large-scale integration (VLSI), robotics machine perception, sensing technologies, human-computer interface (HCI),

'big data' and data analytics, machine learning and artificial intelligence, computer vision and graphics, technology and Behavior, software engineering, as well as wireless and mobile computing and networking, bioinformatics and health informatics.

Program Focus

- ▶ This program focuses on the core skills needed to build a successful, advanced career in computer science, engineering and technology-related areas. It explores research methods, applied data analytics, advanced algorithms and data structure, computer architecture and VLSI, ethics, technical writing, and a number of relevant specialties.
- ▶ Students are required to conduct original and guided research with faculty supervision that concentrates on the contemporary issues in computer science and engineering which are globally important and also relevant to Qatar.
- ▶ The program provides our students with a broad understanding of the field, together with the flexibility to specialize in contemporary and up-to-date areas of computer science and engineering.

Curriculum

This program comprises a minimum of 54 credits taught in English and requires a master's degree in Computer Science or Engineering, Electrical Engineering, or related fields; it can be completed typically in three to four years.

- ▶ Two core courses to provide students coming from diverse backgrounds with a coherent learning environment that enables them to tackle complex issues in computer science and engineering.

The core courses are:

- ▶ Research Methods and Ethics in ICT
- ▶ Applied Data Analytics

One of the following two courses is required to complete the three-core course requirement, depending on whether the student is interested in a hardware or software research area:

- ▶ Principles of Computer System Design
- ▶ Advanced Algorithms and Data Structures

- ▶ Three elective courses covering some engineering and science fundamentals plus a variety of computer science and engineering electives, which provide students with a solid base to fully understand different aspects of computer science and engineering and the interrelations between them.
- ▶ Two semesters of graduate research seminars.
- ▶ A research thesis with a minimum of 36-credits under the supervision of an adviser and a PhD dissertation committee.

PhD students should additionally:

- ▶ Pass a qualifying examination in their third semester
- ▶ Successfully defend their thesis proposal to the committee
- ▶ Successfully complete a PhD dissertation

Division of Engineering Management and Decision Sciences

Master of Science and PhD Programs in Logistics and Supply Chain Management

The Master of Science (MS) and Doctor of Philosophy (PhD) programs in Logistics and Supply Chain Management (LSCM) offer innovative multidisciplinary curricula featuring a unique learning and research experience for students. During the course of their academic studies at CSE's Division of Engineering Management and Decision Sciences, students will develop essential skills and a knowledge of engineering, management, and decision-making processes.

Currently, there are no graduate academic programs on offer in Qatar and very few in the region focused in the area of logistics and supply chain management, to prepare and train increasingly needed human capital. The programs are specifically aimed at building high-quality academic and entrepreneurial capacities to cope with the aggressive rate of change and expansion of supply chains, in addition to the challenges associated with the scaling of industrial systems. Notably, students will benefit from working with stakeholders from government, industry, and academia.

Program Focus

Logistics and supply chain management focuses on activities such as transportation, procurement, distribution, maintenance, green supply chains, manufacturing and system design, data analytics, operations, product development, and customer service.

Overall, the programs are designed to be:

- ▶ Multidisciplinary: Students will acquire a range of essential skills to successfully lead and make informed business decisions based on analytics, supply chain optimization, manufacturing and system design, identification of optimal logistics choices, and finally contributing to guiding organizational and state policies.
- ▶ Conducive to building management and leadership skills: Students will develop the skills necessary to drive the logistics and supply chain management fields in Qatar and beyond.

- ▶ Research-oriented: Research is an integral part of the programs through which students draw on their knowledge, compile original data, test their hypotheses, and develop a research thesis that helps them advance local and regional insight into logistics and supply chain management.

Curriculum

Master of Science in Logistics and Supply Chain Management:

A 33-credit full-time program that is typically completed in two years, and that includes:

- ▶ Three core courses
- ▶ Five elective courses (six if undertaking an industrial project)
- ▶ A nine-credit research thesis or a six-credit industrial/applied project
- ▶ Two semesters of graduate research seminars

PhD in Logistics and Supply Chain Management:
A 54-credit program that requires a master's degree and is typically completed over three years.

The program includes:

- ▶ Three core courses
- ▶ Three elective courses
- ▶ Three semesters of graduate research seminars
- ▶ A minimum of 36-credit research thesis under the supervision of an adviser and a PhD dissertation committee

PhD students should also:

- ▶ Pass a qualifying examination in their third semester
- ▶ Pass a candidacy examination (dissertation proposal) in their fifth semester
- ▶ Successfully defend their final dissertation to the public and their dissertation committee

Division of Sustainable Development

Master of Science and PhD Programs in Sustainable Energy

The MS and PhD programs in Sustainable Energy provide students with extensive knowledge in topics related to sustainable energy, energy-economy interdependencies, urbanization, transportation and manufacturing on energy and overall sustainable development. The programs also look at the implications and drivers of sustainable policy-making on society, the economy, and the environment.

A key component for both degrees is original, guided research in energy science, technologies and policies that support sustainable development.

The multidisciplinary approach to the curricula allows for engagement in cross-disciplinary science and builds fundamental knowledge that evolves with developments in the energy field, equipping graduates with the tools needed to pursue a wide variety of career paths.

Program Focus

- ▶ Skills to build a successful career in science, engineering, technology and developmental studies including ethics, technical writing, research methods, data analytics, and advanced computing methods.
- ▶ Fundamentals of energy engineering, sciences and technologies for sustainability.
- ▶ Fossil fuel energy use and environmental impact.
- ▶ Engineering and scientific development of renewable green energy.
- ▶ Energy storage, distribution and consumption efficiency.
- ▶ Social and economic aspects of sustainability including, but not limited to, demand side management, efficiency, human capacity building, sustainable financing, and policymaking.

Curriculum

Master of Science in Sustainable Energy:
A 33-credit full-time program over two years, that includes:

- ▶ Three core courses
- ▶ Five elective courses (six if taking industrial/applied thesis/project)
- ▶ A nine-credit research thesis
- ▶ Two graduate research seminars

The master's program can be customized to focus on different aspects of sustainable energy such as renewable energy systems, conventional energy systems, energy and mobility, energy and urbanization, and energy and the environment.

PhD in Sustainable Energy:
A 54-credit program that requires a master's degree and is typically over completed in three years.
The program includes:

- ▶ Three core courses
- ▶ Three elective courses
- ▶ Three semesters of graduate research seminars
- ▶ A minimum 36-credit research thesis under the supervision of an adviser and a PhD dissertation committee

PhD students should also:

- ▶ Pass a qualifying examination in their third semester
- ▶ Pass a candidacy examination (dissertation proposal) in their fifth semester
- ▶ Publish a minimum of two original research papers in Scopus – indexed journals
- ▶ Successfully defend their final dissertation to the public and their dissertation committee

Division of Sustainable Development

Master of Science and PhD Programs in Sustainable Environment

CSE’s Sustainable Environment master’s and PhD programs provide students with extensive knowledge in topics related to sustainable environment issues. These include the effect of human development on the environment; the causes, impact and control of pollution (air, land, water); and the demands of a growing global and regional population and economic development on natural resources and the environment.

Students conduct original and guided environmental research that concentrates on issues surrounding the support of sustainable development.

The multidisciplinary approach to the curricula builds fundamental knowledge that evolves with the developments within the field, equipping graduates with the tools needed to pursue a wide variety of career paths.

Program Focus

- ▶ Core skills to build a successful career in science, engineering and technology-related areas, including ethics, technical writing, research methods, data analytics, and advanced computing methods.
- ▶ Fundamentals of sustainable development and human-environment interactions related to policy, social issues, engineering and technology, and the fundamentals of environmental processes.
- ▶ Water demand, resource management, and treatment processes.
- ▶ Air emission sources and how these relate to human activity, as well as the impact on human health, economic and social development; and the chemistry, cause and mitigation of key pollutants.
- ▶ Explore the impact of human activities such as industrial development, energy generation, water treatment, food production and manufacturing, transportation on land, water and air, including solid and hazardous waste generation and disposal.
- ▶ Social and economic aspects of sustainability including demand side management, efficiency, human capital, financing, and policymaking.

Curriculum

Master of Science in Sustainable Environment:
A 33-credit full-time program, taught in English over two years, that includes:

- ▶ Three core courses
- ▶ Five elective courses (six if undertaking an industrial project)
- ▶ A nine-credit research thesis or a six-credit industrial/applied project
- ▶ Two semesters of graduate research seminars

PhD in Sustainable Environment:
A 54-credit program taught in English, typically over three years and requires a master’s degree.

- The program includes:**
- ▶ Three core courses as per the MS program
 - ▶ Three elective courses
 - ▶ Three semesters of graduate research seminars
 - ▶ A minimum of 36-credit research thesis under the supervision of an adviser and a PhD dissertation committee

PhD students should additionally pass:

- ▶ A qualifying examination in their third semester
- ▶ A candidacy examination (dissertation proposal) in their fifth semester
- ▶ Publish a minimum of two original research papers in Scopus – indexed journals
- ▶ Successfully defend their final dissertation to the public and their dissertation committee

Division of Information and Computing Technology

Master of Data Analytics in Health Management

The Master of Data Analytics in Health Management (MDA-HM) program is the first of its kind in the world and aims to train talented scientists and researchers to effectively contribute to the design and implementation of data analytic tools in health care systems in Qatar and beyond. The HBKU MDA-HM program aims to equip students with knowledge of the latest advances in the tools and principles of big data handling and analysis and their application in managing the ever-growing health data.

During the course of their studies at CSE, students will undergo specialized training that will equip them to develop advanced and effective strategies and policies to enhance preventive care, reduce per capita cost of patient care, and enhance progress in diagnostics and medical research leading to the development of more efficient healthcare systems. Uniquely, the program will also give students a myriad of opportunities to collaborate with professionals from relevant industrial and government sectors around the world, inspiring the student body with positive qualities of leadership, social consciousness, integrity, and general ethics.

Program Focus

Combining data analytics with health care management for the first time, the MDA-HM program uniquely focuses on educating students on the latest advances in the tools and technologies involved in big data analytics for health management applications. Furthermore, the program aims to train participants in various applied techniques, methodologies, and tools to effectively manage and analyze the constant growth of health data, in order to drive higher productivity in the healthcare sector.

Enrolled students will:

- ▶ Develop core knowledge in data analytics. Students will acquire essential skills for scientific studies, research work, and decision-making through undergoing core courses that include artificial intelligence in healthcare, principles of health informatics, computational bioinformatics, and research methods and ethics in health and genomics.

- ▶ Master big data systems for multiple disciplines, exploring the impact of examining big data (large datasets containing a variety of data types for health or other applications).
- ▶ Furthermore, students will be trained to master state-of-the-art tools and methodologies in uncovering hidden patterns, unknown correlations, market trends, customer preferences and other useful business information from big data.
- ▶ Study ethics involved in data analytics: Students will obtain a deep knowledge of today's health management systems and their pitfalls. Importantly, they will apply high ethical standards and propose draft policies for dealing with big data applied to health management. A key objective of the MDA-HM program is to foster a strong understanding of health management values, policies, challenges and opportunities, as well as their impact on health.

Curriculum

A 33-credit program taught in English typically over two years, that includes:

- ▶ Four core courses (12 credits)
The core courses are:
 - ▶ Artificial Intelligence and Machine Learning in Healthcare
 - ▶ Principles of Health Informatics
 - ▶ Computational Bioinformatics
 - ▶ Research Methods and Ethics in Health and Genomics
- ▶ Four elective courses from the College of Science and Engineering and College of Health and Life Sciences with emphasis on health management
- ▶ Research Thesis (9 credits)
- ▶ Applied project (6 credits) and an extra elective course
- ▶ One semester of graduate research seminars

Division of Information and Computing Technology

Master of Information Systems in Health Management

The Master of Information Systems in Health Management is a unique program designed to prepare students for professional roles in the design and management of information systems and services in healthcare organizations.

While Qatar has already started the digitization of health records and implementation of digital-based data collection and storage systems, there is limited access to expertise in implementation and management of such health information systems. The Master of Science in Information Systems for Health Management addresses the shortage in skilled resources with expertise in health information systems, which is urgently required, as highlighted in the National E-Health and Data Management Strategy commissioned by the Ministry of Public Health in 2015.

Graduates of this program will be able to pursue a variety of career paths in different healthcare settings, including hospitals, clinics, primary care facilities, national health services, physician offices, insurance providers, long-term care organizations, pharmacies,

IT companies, industries linked to health information and management functions, health information and research centers.

Program Focus

The Master of Information Systems in Health Management emphasizes teaching principles and methodologies of information system management, health informatics, health record systems, and health data management. The program develops students' technical and managerial skills to organize and implement information-based healthcare systems. Through active collaboration with healthcare sectors and government ministries in Qatar, the program will provide industry-based projects and internships to students.

Graduates of this program are equipped to:

- ▶ Demonstrate advanced knowledge of the technological infrastructure needed to deploy healthcare solutions including quality of services, privacy, and security aspects.

- ▶ Assess the information technology resources needed to deploy healthcare solutions that meet the needs of the local community.
- ▶ Analyze, design, implement, and test technical solutions that include database and data communication components.
- ▶ Evaluate the performance of technical solutions to guarantee the delivery of services over time.
- ▶ Manage technical solutions given local constraints, organizational context, and policies relating to health.

Curriculum

A 33-credit program, taught in English over two years, which includes:

- ▶ Four core courses (12 credits)
 - ▶ Information Technology Project Management
 - ▶ Information Systems Analysis and Design
 - ▶ Information Systems Management
 - ▶ Healthcare Information Systems

- ▶ Five elective courses (15 credits), covering the fundamentals of storing, accessing, processing and protecting health information that will help students to apply effective data integration and implementation – such as advanced data management systems, security risk analysis, biostatistics and bioinformatics, principles of health informatics, data science tools and applications, interaction design for healthcare, computer and network security, network forensics, data warehousing, security of clinical information systems, enterprise systems, and decision analysis and decision support systems.
- ▶ Industrial project (6 credits), offers a route for students to further develop real-world, practical problem-solving experience
- ▶ One graduate research seminar

Division of Information and Computing Technology

Master of Science in Cybersecurity

Cybersecurity is a multidisciplinary field addressing issues that ensure secure and reliable operations at all levels of interconnected computing and networking systems. The Master of Science in Cybersecurity is designed to train graduate scholars, professionals, entrepreneurs, leaders, and researchers in the advanced knowledge and skills required to fully understand and implement the technologies, tools, management methods, and policy issues related to cybersecurity.

This Master of Science program not only covers multidisciplinary fields related to cybersecurity technology but also examines policy, ethics, and management related to IT security and cyber threats. The program leverages strong partnerships and collaborations both within HBKU and beyond the university. Delivery of the program involves collaborations with HBKU's research institutes, most notably with QCRI.

This program also builds on work with industrial and governmental partners, both local and international, who are currently working on critical projects aimed

at providing solutions to address global challenges and lead to a safer cyber world, in support of Qatar's aspirations in this area.

The program offers its students the option of either completing a research thesis or working on an industrial project. The thesis requires in-depth theoretical and research components, possibly leading to a scientific publication, co-authored by the student in a top venue, while the industrial project offers a route for students to further develop real-world problem-solving experience.

The program includes a core course in leadership and innovation, ensuring that all graduates are equipped with the skills and knowledge to assume leading roles within academic, governmental, and non-governmental organizations.

Program Focus

- ▶ The development of extensive and advanced knowledge in the field of cybersecurity, covering major areas such as applied cryptography, computer and network security, secure software/hardware systems and cybersecurity policy, management, and ethics.

- ▶ A multi-faceted curriculum covering multidisciplinary aspects that are not only related to cybersecurity technology but also cover policy, management, ethics and IT security.
- ▶ Hands-on experience with real-world projects related to secure software and hardware design and implementation, secure mobile systems, information security, risk analysis, computer and network forensics, among others.
- ▶ A research thesis or industrial project involving original work related to cybersecurity, guided by world-class faculty from HBKU, its research institutes, and other stakeholders.

Curriculum

A 33-credit program taught in English, typically over two years, that includes:

- ▶ Four core courses that provide students coming from diverse backgrounds with a coherent learning environment to tackle issues in cybersecurity.

The core courses are:

- ▶ Research Methods and Ethics in ICT
- ▶ Applied Cryptography
- ▶ Computer and Network Security
- ▶ Security Risk Analysis

- ▶ Four elective courses covering engineering and computer science topics, in addition to a variety of cybersecurity electives that provide students with a solid base and a depth of knowledge, which fully enable them to understand different aspects of cybersecurity. Additionally, there will be the opportunity to take an elective focusing on entrepreneurship.
- ▶ One semester of graduate research seminars aimed at expanding students' horizons by offering a broad range of topics, through talks by invited experts and presentations from those working in industry, research institutes, academia, and government institutions and organizations.
- ▶ A nine-credit research thesis or a six-credit industrial project.
- ▶ Selecting the industrial project would require the student to choose a further elective.

Division of Information and Computing Technology

Master of Science in Data Science and Engineering

The Master of Science program in Data Science and Engineering aims to provide students with a strong foundation in data engineering, ‘big data’ science, and data analysis. The program integrates the knowledge, expertise and educational assets of HBKU and its research institutes in data collection, management and analytics, and scalable data-driven knowledge discovery, as well as the fundamental concepts behind these techniques.

The program aims to equip students with state-of-the-art methods and theory related to the next generation of ‘big data’ technology. It offers its participants the option of either completing a research thesis or working on an industrial project.

Program Focus

- ▶ Fundamental knowledge in data science, engineering and technology, spanning areas such as applied statistics, machine learning, and technological tools such as cloud platforms for large-scale data analysis.
- ▶ Hands-on experience in real-world projects related to scalable big data collection, storage, management, analysis and mining, as well as knowledge extraction and discovery.
- ▶ Research thesis or industrial project involving original work related to data science and engineering, guided by world-class faculty from CSE and from HBKU’s research institutes.

Curriculum

A 33-credit program, taught in English, typically over two years, that includes:

- ▶ Four core courses that provide students from diverse backgrounds with a coherent learning environment to tackle issues in data science and engineering.

The core courses are:

 - ▶ Research Methods and Ethics
 - ▶ Statistics for Science and Engineering
 - ▶ Advanced Data Management Systems
 - ▶ Applied Data Analytics
- ▶ Four elective courses covering some engineering and science fundamentals in addition to a variety of data science and engineering electives, providing students with a solid base and depth to fully understand different aspects of data science and engineering, and the interrelations between them.

- ▶ One semester of graduate research seminars aimed at expanding students’ horizons by offering a broad range of topics covered through invited talks and presentations from industry, research institutes, academia, and government institutions and organizations.
- ▶ Students are also recommended to take a machine-learning course as an elective.
- ▶ A nine-credit research thesis or six-credit industrial project.
- ▶ The program offers flexibility by enabling students to focus on different areas of interest through the choice of electives and projects related to data science and engineering, such as data collection, storage, management, analysis, and knowledge extraction and discovery.

Division of Engineering Management and Decision Sciences

Master of Science in Sport and Entertainment Management



The Master of Science in Sport and Entertainment Management (MSEM) is offered by Hamad Bin Khalifa University’s College of Science and Engineering (CSE), working toward a joint degree with the University of South Carolina (UofSC). Identified as the first master’s degree in sports and entertainment management in Qatar and one of a few in the MENA region, the program trains and prepares students for management and leadership roles in the sports and entertainment industries. In 2018, USC’s MSEM program was ranked number 6 worldwide by Sport Business International.

The MSEM aims to support Qatar’s objectives by qualifying professionals with a variety of skills and experiences covering the legal, financial, as well as the operational and management aspects of the sports and entertainment industries. Graduates of the program could pursue a variety of career paths in the private and public sports sectors including sponsorship, marketing, event management, facility management, TV broadcasting, and academia and research.

Program Focus

The MSEM provide students a comprehensive and holistic overview of the sports and entertainment industries, as well as a multi-disciplinary skill set which will enable them to address the complex challenges of the global sports and entertainment sector. Additionally, students will be able to develop and explain workable solutions to various industry problems.

Graduates of this program are equipped to:

- ▶ Apply learned concepts and theory to demonstrate an understanding of the nature of the sports and entertainment industries.
- ▶ Understand and have an appreciation for how research is used by and is beneficial for sports and entertainment organizations and/or academics.
- ▶ Demonstrate an ability to develop and explain workable solutions to various industry problems related to sports and entertainment.

Curriculum

The MSEM is a 36-credit hour degree program, taught over two years in English, and designed to train students for management and leadership roles in the sports, entertainment, and venue management industries. Successful students will have skills at the intersection between management, finance, and law. The acquired skills will enable graduates to efficiently deal with several challenges within the sports and entertainment industries. It is possible for students to choose between thesis and non-thesis options.

Thesis Option:

Students electing the thesis option must complete 27 credit hours of required courses, complete at least nine credit hours of elective course work from which a maximum of nine credit hours may be taken outside of the program.

Non-Thesis Option:

Students electing the non-thesis option must complete 21 credit hours of required courses, complete at least 15 credit hours of elective course work from which a maximum of nine credit hours may be taken outside of the program, and pass a comprehensive examination upon completion of all course work. Students selecting the non-thesis option may (but are not required to) enroll in a field project in Hospitality, Retail, or Sport Management for six elective credit hours.

Required courses will cover topics such as:

Venue Management: Principles and Practices, Management in the Sport and Entertainment Industry, Advanced Sport and the Law, Principles of Sport and Entertainment Marketing, Sport and Entertainment Finance, Statistical Methods, and Applied Research in Hospitality, Retail, and Sport Management.

Division of Information and Computing Technology

Bachelor of Science in Computer Engineering

The aim of HBKU's Bachelor of Science in Computer Engineering program is to produce globally competitive computer engineering professionals for Qatar, the region, and the wider world.

The program is built on HBKU's unique model of developing interdisciplinary programs that draw on the expert knowledge of its partner institutions alongside its own faculty. This means that students are able to take courses provided by Texas A&M University at Qatar and Carnegie Mellon University in Qatar in addition to the comprehensive range of course offerings from HBKU.

Students explore the design of real-world computer engineering systems and are exposed to real-life problems and challenges through a design component that is integrated into the program, as well as through a final year project.

The dynamic multidisciplinary approach of the curriculum equips the program's graduates with an exceptionally well-rounded understanding of computer engineering, ensuring that they have all the necessary skills needed for them to go on to explore a wide range of rewarding careers or further study.

Program Focus

- ▶ The cross-disciplinary aspects of computer science and electronic engineering.
- ▶ A thorough understanding of computing devices, systems, and tools – ranging from specialized embedded processors to communication networks to software development.
- ▶ The skills needed to design a computer-based system.
- ▶ The application of mathematics in engineering.
- ▶ The role of hardware and software tools in solving engineering problems.
- ▶ Ethical and professional responsibility in computer engineering.
- ▶ The role of computer engineering and of computer engineers in society, both at a local and a global level.

Curriculum

A full-time program, taught in English over four years, comprising:

- ▶ General educational courses (in humanities, history, and creative arts)
- ▶ Mathematics and science courses
- ▶ Core computer engineering courses
- ▶ Core curriculum electives
- ▶ General engineering electives
- ▶ English communication electives

Typically, grade assessments are based on a final examination, mid-term examinations, quizzes, and assignments that include project and/or laboratory work. Credits are earned semester-by-semester, of which there are eight (two per year, spread across four years).

Each student is required to complete a final year project as a member of a team of two to four classmates. The goal of this project is to give students the opportunity to integrate and synthesize the theoretical and experiential knowledge they have built up over the duration of the program.

The final year project is conducted under the supervision of faculty.

Division of Information and Computing Technology

An Accelerated Master's Program

The computer engineering program at HBKU provides qualified undergraduate students with the opportunity to apply to a “4+1” accelerated path of study.

It allows them to graduate with a Bachelor of Science degree in computer engineering, as well as a Master of Science degree in data science and engineering or a Master of Science degree in cybersecurity, within five years only, as opposed to the traditional six years.

Through the “4+1” accelerated program, qualified students in their senior year of undergraduate studies will be admitted to the master's degree program and will be offered the opportunity to take graduate-level classes that can be used to fulfill the master's degree requirement, hence enhancing their research capabilities by exposing them to advanced graduate courses.

Students who are eligible for such an option will undergo extensive research training and will have the opportunity to enroll in research thesis work under the supervision of HBKU faculty.

They will also be offered the opportunity to intern at one of HBKU's research institutes, including Qatar Computing Research Institute (QCRI). Students admitted to this accelerated program can use credits hours towards both their bachelor and master's degrees, hence shortening the time it takes to earn a master's degree.



The background features a large, light blue rectangle on the right side, which contains the word 'Admissions'. To the left of this rectangle, there is a dark blue triangle pointing towards the top-left corner, and a medium blue triangle pointing towards the bottom-left corner. These two triangles overlap each other and the light blue rectangle.

Admissions

Admission Requirements

Applicants seeking admission to the College of Science and Engineering graduate programs at HBKU should have a strong academic record (minimum 3.0 GPA out of 4.0) from a recognized university. Applicants to the master’s programs

should have a bachelor’s degree, while applicants to the PhD programs should have a master’s degree. Applicants should check the program they are applying for in order to make sure that they have majored in one of the disciplines mentioned under “required field of study.”

| Apply to | Required field of study |
|--|---|
| PhD in Computer Science and Engineering | Computer science, computer engineering, electrical and electronic engineering, information systems, mathematics and related fields. |
| PhD in Logistics and Supply Chain Management | Engineering, computer science, information systems, business, finance, economics, management, mathematics and other related fields. Students are required to demonstrate strong analytical skills. |
| PhD in Sustainable Energy | Engineering and science disciplines preferred. Students from architecture, urban planning, business, economics, policy, and social sciences demonstrating strong analytical skills will also be considered. |
| PhD in Sustainable Environment | |
| Master of Science in Data Science and Engineering | Computer science, information systems, engineering, mathematics and related fields. |
| Master of Science in Cybersecurity | |
| Master of Data Analytics in Health Management | Computer science, information systems, electrical engineering, mathematics, statistics or related fields. Applicants from health and medical fields may be considered provided they have some knowledge of computer programming and relevant work experience. |
| Master of Information Systems in Health Management | Computer science, information systems, computer engineering. Applicants from health and medical fields with relevant work experience may also be considered. |
| Master of Science in Logistics and Supply Chain Management | Engineering, computer science, information systems, business, finance, economics, management, mathematics and other related fields. Students are required to demonstrate strong analytical skills. |
| Master of Science in Sport and Entertainment Management | Sport related degrees, management, finance, engineering, business and related fields. Applicants who have studied other fields may be considered. |
| Master of Science in Sustainable Energy | Engineering and science disciplines preferred. Students from architecture, urban planning, business, economics, policy and social sciences demonstrating strong analytical skills will also be considered. |
| Master of Science in Sustainable Environment | |

Applicants are required to submit a valid IELTS score of 6.5 or TOEFL score of 79 to demonstrate their proficiency in English. Further details about the language proficiency requirement and the process to seek exemption (where this is an option) are available from admissions.hbku.edu.qa

Applicants to some PhD programs at the College of Science and Engineering are required to submit a valid GRE or GMAT test score at the time of application. Please see the table below for further information:

| Programs | GRE/GMAT |
|--|----------|
| PhD in Computer Science and Engineering | Optional |
| PhD in Logistics and Supply Chain Management | Required |
| PhD in Sustainable Energy | Required |
| PhD in Sustainable Environment | Required |

While the GRE is not required for admission to the master’s programs at the College of Science and Engineering, a strong GRE score will help strengthen the applicant’s admission material. Applicants with prior research experience are preferred, especially for the PhD programs



Application Requirements

Application:

A completed online application form
admissions.hbku.edu.qa

Academic transcripts:

Official electronic copies of transcripts should be submitted as part of the online application. Final transcripts and graduation statements are required for all previous university studies. All transcripts submitted should include an explanation of the grading system. For those who have not completed their current studies, transcripts must include results from the last completed semester of coursework. Transcripts in languages other than English or Arabic must be accompanied with an official translation. Applicants who are admitted to the program based on copies of or incomplete transcripts will be required to provide original transcripts upon enrollment in order to register for courses.

Standardized test results:

Official copies (where required) must be sent directly to HBKU. Please refer to the institutional codes below:

- ▶ GRE: 7551
- ▶ GMAT: H6S
- ▶ TOEFL: 4981
- ▶ IELTS: No code required. Students should ask the IELTS center where they tested to send the IELTS TRF to Hamad Bin Khalifa University

Applicants should also submit copies of their test scores with the online application.

Letters of recommendation:

Applicants should submit two letters of recommendation, one of which must be from an academic referee.

Please visit admissions.hbku.edu.qa for further information about the submission process.

Personal statement of interest:

Applicants should submit a personal statement (300-500 words) as part of the online application. The statement should explain why the candidate is applying to the program, and how their studies will contribute to the achievement of their personal objectives, including information about the applicant’s research interests and achievements.

Personal statements that are incomplete or below the minimum word count will not be accepted.

Resume/curriculum vitae:

Applicants should submit a copy of their current resume or curriculum vitae as part of the online application.

This should include the following information:

- ▶ Academic qualifications
- ▶ Professional experience
- ▶ Publications
- ▶ Research projects
- ▶ Academic awards or honors
- ▶ Conference presentations

Identification document:

All applicants should submit an electronic copy of their passport as part of the online application. Nationals and residents of Qatar should also submit their valid Qatari ID.

Tuition and Student Funding

The College of Science and Engineering provides a limited number of tuition waivers on a competitive basis.

| Program | Total Program Tuition Fees | Tuition Fees per Credit Hour | Total Program Credit Hours | Program Duration |
|--|----------------------------|------------------------------|----------------------------|------------------|
| PhD in Computer Science and Engineering | QAR 273,750 | QAR 5,069 | 54 | 3 years |
| PhD in Logistics and Supply Chain Management (LSCM) | QAR 273,750 | QAR 5,069 | 54 | 3 years |
| PhD in Sustainable Energy | QAR 273,750 | QAR 5,069 | 54 | 3 years |
| PhD in Sustainable Environment | QAR 273,750 | QAR 5,069 | 54 | 3 years |
| Master of Data Analytics in Health Management | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Information Systems in Health Management | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Science in Cybersecurity | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Science in Data Science and Engineering | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Science in Logistics and Supply Chain Management | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Science in Sport & Entertainment Management | QAR 182,500 | QAR 5,069 | 36 | 2 years |
| Master of Science in Sustainable Energy | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Master of Science in Sustainable Environment | QAR 182,500 | QAR 5,530 | 33 | 2 years |
| Bachelor of Science in Computer Engineering | QAR 292,000 | QAR 2,281 | 129 | 4 years |



Contact Information

cse.hbku.edu.qa

Admission inquiries:
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and Decision Sciences**
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**Division of Information and
Computing Technology**
admissions.cse.ict@hbku.edu.qa

Division of Sustainable Development
admissions.cse.sus@hbku.edu.qa

General inquiries:
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