جامعة الحسين التقنية
Al Hussein Technical University

School of Computing and Informatics
BSc in Computer Science

➢ **Table 1** University Requirements

Course Number	Course Name	Course Type	CH	Prerequisite(S)
0030301121	English Pre-Intermediate Intensive + Lab	HTU	4	Pre-Foundation English Elementary Intensive + Lab (0030301120)
0030301122	English Intermediate	HTU	3	English Pre-Intermediate Intensive + Lab (0030301121)
0030301123	English Upper - Intermediate	HTU	3	English Intermediate (0030301122)
0030301124	English Advanced	HTU	3	English Upper – Intermediate (0030301123)
0040302111	Professional Skills	HTU	1	
0040302211	Professional Practice	HNC	3	[Professional Skills (0040302111) or Soft Skills I (30302111)] and English Intermediate (0030301122)
0040302231	Entrepreneurship Bootcamp	HTU	4	English Upper – Intermediate (0030301123) + [Professional Practice (0040302211) or Soft Skills II (30302112)]
0030301111	Arabic Language & Communication Skills	HTU	1	Remedial Arabic Language (30301110)
0030302129	Military Science	HTU	1	
0030302232	Leadership Camp	HTU	1	Entrepreneurship Bootcamp (0030302231) or Entrepreneurship Bootcamp (0040302231)
	University Elective I	HTU	1	
	University Elective II	HTU	1	
	University Elective II	HTU	1	
	Total		**27**	

➢ **Table 2** College Requirements

Course Number	Course Name	Course Type	CH	Prerequisite(S)
0030303111	Functional Math	HTU	3	Remedial Math (0030303110)
0040303121	Maths for Computing	HNC	3	Functional Math (0030303111)
0040303130	Fundamentals of Computing	HTU	4	
0040201100	Programming	HNC	3	Fundamentals of Computing (0040303130)
0040303221	Discrete Maths	HND	3	Maths for computing (0040303121) Corequisite Data Structures & Algorithms (0040201201)
0040201290	Planning a Computing Project	HNC	4	Professional Practice (0040302211)

0030303121	STEM Lab I	HTU	1	
	Total		**21**	

- **Table 3** Department Requirements

Course Number	Course Name	Course Type	CH	Prerequisite(S)
0010203180	Networking	HNC	3	Fundamentals of Computing (0040303130)
0040201260	Website Design & Development	HNC	3	Programming (0040201100)
0040201201	Data Structures & Algorithms	HND	3	Programming (0040201100)
0000203280	Security	HNC	3	Fundamentals of Computing (0040303130)
0040201200	Advanced Programming	HND	3	Programming (0040201100)
0040201261	Prototyping	HND	3	Software Development Lifecycles (0040201220)
0040201360	Application Development	HND	3	Prototyping (0040201261)
0040201220	Software Development Lifecycles	HNC	3	Programming (0040201100)
0000201391	Computing Research Project	HND	6	Planning a Computing Project (0040201290)
0010204282	Database Design & Development	HNC	3	Programming (0040201100)
0010204312	Business Intelligence	HND	3	Database Design & Development (0010204282)
0040201321	Systems Analysis & Design	HND	3	Software Development Lifecycles (0040201220)
0010203380	Computer Organization and Design	HTU	3	Programming (0040201100) + Corequisite Discrete Maths (0040303221)
0040201341	Operating Systems	HND	3	Data Structures & Algorithms (0040201201)
0040201362	Games Engine & Scripting	HTU	3	Programming (0040201100)
0040201320	ERP Systems	HTU	3	Application Development (0040201360)
0040201430	Database Programing	HTU	3	Database Design & Development (0010204282) + Data Structures & Algorithms (0040201201)
0040201440	Systems Programing	HTU	3	Operating Systems (0040201341)
	Elective I	HTU	3	
	Elective II	HTU	3	
	Elective III	HTU	3	
0040201491	Capstone project I	HTU	1	>=90 hrs including core courses
0040201492	Capstone project II	HTU	2	Capstone project I (0040201491)
0040201390	HNC Training	HTU	12	Minimum number of completed hours >= 85
0040201490	HND Training	HTU	6	Corequisite HNC Training (0040201390)
	Total		**87**	

- **Table 4:** List of Elective Courses (9 CH):

Course Number	Course Name	Course Type	CH	Prerequisite(S)
0040201441	Internet of Things	HTU	3	Networking (0010203180) + Operating Systems (0040201341)
0040201450	Cloud Computing	HTU	3	Networking (0010203180) + Operating Systems (0040201341)
0040201462	Virtual & Augmented Reality Development	HTU	3	Games Engine & Scripting (0040201362)
0040201460	E-Commerce	HTU	3	Website Design & Development (0040201260)
0040201442	Real Time Systems	HTU	3	Operating Systems (0040201341)
0040201461	Mobile Application Development	HTU	3	Application Development (0040201360)
0000204414	Data Analytics for IT Professionals	HTU	3	Business Intelligence (0010204312)
0000204456	Artificial Intelligence for IT Professionals	HTU	3	Business Intelligence (0010204312)
0040201470	Special Topics	HTU	3	Department Approval

➢ **Table 5** Course Brief Description

Course Name	Course Brief Description
Functional Math	This course reviews the fundamental concepts in numerical analysis, linear algebra, functions and graphs, differentiation, integration, and metrics. It strengthens the problem formulation skills (i.e., the ability to translate real application problems into a series of mathematical processes). It also focuses on developing the mathematical reasoning skills, such as mathematical deductions and proofs.
Maths for Computing	This course introduces students to the mathematical principles and theory that underpin the computing curriculum. Through a series of case studies, scenarios and task-based assessments students will explore number theory within a variety of scenarios; use applicable probability theory; apply geometrical and vector methodology; and finally evaluate problems concerning differential and integral calculus. Among the topics included in this course are prime number theory, sequences and series, probability theory, geometry, differential calculus and integral calculus.
Fundamentals of Computing	This course provides a comprehensive route to developing an in-depth exposure to personal computers, hardware, and a range of operating systems. Students learn the functionality of various hardware and software components and best practices in maintenance and safety issues. In addition to, basic computer skills, programming concepts, algorithms, variables and data types; arithmetic, logical, relational, Boolean, and assignment operators; simple input and output statements, selection structures, loop structures, single and multidimensional arrays, character strings, functions, data structures, input/output file operations.
Programming	Define basic algorithms to carry out an operation and outline the process of programming an application; Comparative programming language paradigms, procedural, object-orientated and event-driven programming languages. Design and tradeoffs of programming language features and implementation, including syntax, control structures, types, and security. Explain the characteristics of procedural, object-orientated and event-driven programming. Analyze Integrated Development Environments (IDEs); Implement basic algorithms in code using an IDE; Determine the debugging process and explain the importance of a coding standard.
Discrete Maths	This course introduces students to the discrete mathematical principles and theory that underpin software engineering. Through a series of case studies, scenarios and tasked-based assessments students will explore set theory and functions within a variety of scenarios; perform analysis using graph theory; apply Boolean algebra to applicable scenarios; and finally explore additional concepts within abstract algebra. Among the topics included in this course are: set theory and functions, Eulerian and Hamiltonian graphs, binary problems, Boolean equations, Algebraic structures and group theory.
Professional Practice	This course provides a foundation for good practice in a variety of contexts. The ability to communicate effectively using different tools and mediums will ensure that practical, research, design, reporting and presentation tasks are undertaken professionally and in accordance with

	various communication conventions. Continuing professional development, self-improvement and working towards various goals is an area that is encouraged in the workplace through the appraisal's framework. Among the topics included in this course are: the development of communication skills and communication literacy; the use of qualitative and quantitative data to demonstrate analysis, reasoning and critical thinking; and tasks that require the integration of others within a team-based scenario and planning and problem-solving.
Planning a Computing Project	The course provides examination of project management principles and modern software project management practices. The fundamental knowledge and skills to enable them to undertake independent research and investigation for carrying out and executing a computing project which meets appropriate aims and objectives. Methods for managing and optimizing the software development process are discussed along with techniques for performing each phase of the systems development lifecycle. Present the project and communicate appropriate recommendations based on meaningful conclusions drawn from the evidence findings and/or analysis. Reflect on the value gained from conducting the project and its usefulness to support sustainable organizational performance.
STEM Lab I	This course develops the basic skills in the fields of science, technology, engineering, and mathematics through a set of practical experiments, covering mechanical, electrical, electronics, automation, mechanics of materials, robotics, computer applications, and process control.
Networking	The aim of this course is to provide students with wider background knowledge of computer networking essentials, how they operate, protocols, standards, security considerations and the prototypes associated with a range of networking technologies. This course will provide students with skills to successfully install operate and troubleshoot a small network; and the operation of IP data networks, router, switching technologies, IP routing technologies, IP services and basic troubleshooting.
Website Design & Development	This course introduces students to the underpinning services required to host, manage and access a secure website before introducing and exploring the methods used by designers and developers to blend back-end technologies (server-side) with front-end technologies (client-side). This course also discusses the reasons, requirements, relationships, capabilities and features of the systems they will be using and gives them an opportunity to explore various tools, techniques and technologies with 'good design' principles to plan, design and review a multipage website. The topics included in this course are: domain structure, domain name systems, web protocols, database servers, development frameworks, website publishing, content management, search engine optimization, web browsers, HTML standards, CSS and CSS pre-processing (LESS, SASS), presentation models, responsive design, integrated development environments, user requirements, interface design, user experience, branding, navigation, optimization and validation.
Data Structures & Algorithms	This course introduces students to data structures and how they are used in algorithms, enabling them to design and implement data structures. The course introduces the specification of abstract data types and explores their use in concrete data structures. Based on this knowledge, students should be able to develop solutions by specifying, designing and

	implementing data structures and algorithms in a variety of programming paradigms for an identified need. Topics included in this course are abstract data types specification, formal data notations, data encapsulation, complex data structures, programming language implementations using handles, pointers, classes and methods, algorithm types, data structure libraries, algorithm complexity, asymptotic testing and benchmarking.
Security	The aim of this course is to provide students with knowledge of security, associated risks and how security breaches impact on business continuity. Students will examine security measures involving access authorization, regulation of use, implementing contingency plans and devising security policies and procedures. Among the topics included in this course are detection of threats and vulnerabilities in physical and IT security, and how to manage and assess risks relating to organizational security. Network Security design and operational topics, including address translation, DMZ, VPN, firewalls, AV and intrusion detection systems. Remote access will be covered, as will the need for frequent vulnerability testing as part of organizational and security audit compliance. Assess risks to IT security; Describe IT security solutions; Review mechanisms to control organizational IT security; Manage organizational security.
Advanced Programming	This course introduces students to the fundamental concepts and techniques necessary to write high-quality programs, including basic concepts of object-oriented programming, modular design, and exception handling. Students will also write code in an object-orientated fashion using design patterns where necessary and model their code structure in UML class diagrams.
Prototyping	This course introduces students to the basic concepts of prototyping; plan, build and measure the success of an appropriate prototype with a specific end user in mind; and conduct testing to gather meaningful feedback and data to improve a prototype or final software application. As a result, students will develop skills such as communication literacy, team working, critical thinking, analysis, reasoning and interpretation, business skills, computer software literacy and language, which are crucial for gaining employment and developing academic competence.
Application Development	This course introduces students to Software Design Document by analyzing a business-related problem and deduce an appropriate solution, including a set of initial requirements, select and use design and development methodologies with tools and techniques associated with the creation of a business application, work individually and as part of a team to plan, prepare and produce a functional business application with support documentation and assess and plan improvements to a business application by evaluating its performance against its Software Design Document and initial requirements.
Software Development Lifecycles	This course introduces students to lifecycle decision-making at different stages of the software development process. Students will examine various lifecycle models and appreciate their particular characteristics to understand which project environments they are most appropriate for. Theoretical understanding will be translated into practical skills through an actual software development lifecycle project and students will become confident in the use of particular tools and techniques relevant to a chosen methodology. Among the topics included in this course are

	iterative and sequential models of software development lifecycles and reference frameworks for initially capturing conceptual data and information through a feasibility study and requirement gathering techniques through to analysis, design and software implementation activities.
Computing Research Project	The course offers the opportunity to engage in sustained research in a specific field of study. They conduct an individual research project under a close supervision. Expose to theoretical or experimental research techniques. In Conduct and present a survey of the literature relevant to the research topic. Prepare a thesis reporting on the research project and its outcomes. They will also be expected to present a poster and a short seminar describing their work.
Database Design & Development	The aim of this course is to give students opportunities to develop an understanding of the concepts and issues relating to database design and development, as well as to provide the practical skills to translate that understanding into the design and creation of complex databases. Topics included in this course are: examination of different design tools and techniques; examination of different development software options; considering the development features of a fully functional robust solution covering data integrity, data validation, data consistency, data security and advanced database querying facilities across multiple tables; appropriate user interfaces for databases and for other externally linked systems; creating complex reports/dashboards, testing the system against the user and system requirements; and elements of complete system documentation.
Business Intelligence	Discuss business processes and the mechanisms used to support business decision-making; Compare the tools and technologies associated with business intelligence functionality; Demonstrate the use of business intelligence tools and technologies; Discuss the impact of business intelligence tools and technologies for effective decision-making purposes and the legal/regulatory context in which they are used.
Systems Analysis & Design	This course introduces students to the processes of systems analysis and design using two methodologies – the traditional systems development lifecycle methodology providing a comprehensive structured framework and the agile methodology with different framework models developed with the emphasis on variations of iterative incremental modelling. To provide perspective, students will examine the models in both these methodologies. They will consider the particular strengths and weaknesses of the two methodologies and examine the suitability of the methodologies using different examples.
Computer Organization & Design	This course introduces students to the principles of digital logic design, computer systems organization and low-level language program development using CPU registers to manipulate data. Students will explore how program instructions and data types can be represented, stored in a computer system, and used to carry out a computing task.
Operating Systems	This course introduces students to different operating systems such as DOS, Windows, UNIX and Linux. The topics covered are the tasks of operating systems such as controlling and allocating memory, prioritizing system requests, controlling input and output devices, facilitating data networking and managing files, including security and protection. Among the topics included in this course are: the history and evolution of

	Operating Systems; the definition of an Operating System; why Operating Systems are needed; how Operating Systems started and developed; Operating Systems management roles; management of memory, processes, processors, devices and files; security and protection: user security, device, application and process protection; inter-process communication; comparison of Operating Systems; distributed and networked systems; concurrent systems; multi-user systems; graphical interface systems; and practical application of Operating Systems: user interface commands of major Operating Systems; installations and extensions of Operating Systems.
Games Engine & Scripting	This course introduces students to the origin and evolution of games engines and their effect on game design, it also expects students to project this path into the future to draw conclusions and predict a possible future for engines. After being introduced to the core services of most engines and their advantages, students are expected to evaluate a range of different engines and debate their features. In addition, and while students assimilate, reflect and consider the advantages and technical challenges of a games engine they will be issued with an existing Games Design Document (supported with all appropriate assets) and challenged with planning and using a specific engine to develop the design into a functional game. On completion, and in addition to the student reviewing and reflecting on the experience, they will be expected to formally assess their functional game against the Games Design Document and user expectation.
ERP Systems	The course provides an overview of Enterprise Resource Planning (ERP) software systems and their role within an organization. It introduces key concepts of integrated information systems and explains why such systems are valuable to businesses. In addition to the lecture, students will be guided through several hands-on activities of various business processes in software products. The course will also provide a discussion on various business cases in which ERP concepts can be applied. An overview of Business Intelligence (BI) and analytics in the ERP context will also be addressed
Database Programing	This course is on the design and implementation of database management systems. Topics include data models (relational, document, key/value), query languages (SQL, stored procedures), storage architectures (heaps, log-structured), indexing (order preserving trees, hash tables), transaction processing (ACID, concurrency control), recovery (logging, checkpoints), query processing (joins, sorting, aggregation, optimization), and parallel architectures (multi-core, distributed). Case studies on open-source and commercial database systems are used to illustrate these techniques and trade-offs. The course is appropriate for students with lit systems programming skills.
Systems Programing	The aim of this course is to learn about design, implementation of stem-level UNIX API's: Process manipulation; IO operations; Use of OS functionality; System level programming in C; Shell programming; Unix system services: file system, process and thread management, inter-process communication: pipes, shared memory, and message queues, Socket programming, and synchronization; UNIX TCP and UDP Communications; Connection-Oriented Client-Server Architecture. 2-

	hours lab covers hands on experience with design and implementing course subject using Linux operating Systems.
Elective I Elective II Elective III	The student can choose two courses from a list of advanced topic courses in Cybersecurity field that will be offered by the department.
Capstone project I Capstone project II	A project-based course intends to reflect different skills and competencies acquired by the student in different courses. The students will learn how to handle a project, starting with the specifications, requirements, design, and implementation then preparing a comprehensive report.
HNC Training HND Training	On-the-job training is a hands-on method of teaching the skills, knowledge, and competencies needed for students to perform a specific job within the workplace. Students learn in an environment where they will need to practice the knowledge and skills obtained during their training.
Internet of Things	This course introduces students to the role, basic concepts and benefits of IoT in the design and development process of computer applications. The aim of the unit is to enhance the student's understanding of the methodology, terminology and benefits of IoT in the design and development of software applications.
Cloud Computing	This course is designed to develop an understanding of the fundamental concept of Cloud Computing, cloud segments, and cloud deployment models, the need for Cloud Computing, an appreciation of issues associated with managing cloud service architecture and to develop a critical awareness of Cloud Computing based projects. Topics included in the course are the paradigms of networking, fundamentals of Cloud Computing, Cloud Computing architecture, deployment models, service models, security, technological drivers, and cloud service providers.
Virtual & Augmented Reality Development	This course introduces students to the role, basic concepts and benefits of VR and AR technology and how to apply them in the development of VR/AR computer applications. The aim of the unit is to enhance the student's understanding of the methodology, terminology and benefits of VR and AR software applications.
E-Commerce	This course will help students gain an understanding of how and why businesses and organizations develop E-Commerce strategies: to remain competitive in the global market. Students will also appreciate the elements and resources required to set up an E-Commerce site and be engaged in the design and implementation of their own strategies that would in reality form part of a secure E-Commerce site. Students will examine the impact that E-Commerce has on society and the global market for consumers, buyers and sellers in terms of the benefits and drawbacks of online purchasing. Through investigation, students will also research the technologies involved in setting up a secure E-Commerce site in preparation for their own E-Commerce strategy. There is an expectation that students will devise a strategy based on an element of E-Commerce such as designing a shopping cart, an ordering system, payment system or an online marketing system, for example. This design should be fully implemented and evaluated accordingly in terms of its success or failure. Standards and levels of support, marketing, CRM, promotion and supply

	chain management will all be explored within the context of developing the implementation strategy.
Real Time Systems	This course covers the principles of real-time systems, Modeling of a Real-Time System, Task assignment and scheduling, Resource management, Real-time operating systems, RTOS services, Programming language with real-time support, System design techniques, Inter task communication, Fault tolerant techniques, Reliability evaluation methods; Performance analysis, Case studies of real-time systems.
Mobile Application Development	This course provides students with an introduction to mobile computing and application development for the Android operating system. Topics will include Introduction to Android IDE, Layout & Activity, Preference and Service Menu, Thread (message), Thread (progress, post, broadcast, & Intent filter), Notification, Dynamic layouts, TTS, and clocks SQLite. This course will cover mobile phone programming components like UI programming, data management, localization, and programming sensors like the accelerometer and compass and mobile OS services. The course will focus on the Android platform and how to use cloud services in applications
Artificial Intelligence & Intelligent Systems	This course is designed to introduce the philosophy behind artificial intelligence, the most efficient techniques of AI and various intelligent systems that help us to overcome various challenges. This unit guides the student to investigate the emerging AI technologies which could solve various real-world challenges and problems.
Special Topics	Selected state-of-the-art topics in Computer Science.