Al-karkh University of Science

جامعة الكرخ للعلوم

First Cycle – Bachelor's degree (B.Sc.) – Cybersecurity Engineering

بكالوريوس علوم - هندسة الامن السيبراني

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1. Overview

This catalogue is about the courses (modules) given by the program of Cybersecurity Engineering to gain the Bachelor of Science degree. The program delivers 52 Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الامن السيبراني للحصول على درجة بكالوريوس العلوم. يقدم البرنامج 52 مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2025-2026

Module 1

Code	Course/Module Title	ECTS	Semester
KUS11001	Mathematics I	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
Mathematics (KUS11001) is a first-semester foundational module that builds students' core competence in integral calculus and its use in engineering and scientific problem solving. It starts by introducing integration as the reverse of differentiation, then develops fluency with indefinite and definite integrals and standard integration rules. Students learn key techniques such as substitution (including completing the square), integration by parts, partial fractions, and trigonometric substitution for handling complex expressions. The module also covers improper integrals and how to determine whether they converge or diverge. Applications are emphasized, including areas under/between curves, and volumes of revolution, linking mathematics to real contexts. Practical connections extend to problems in physics, biology, economics, and engineering, such as work, accumulation, averages, and growth models. Teaching combines theory with tutorials, discussion, and extensive problem solving, supported by structured revision and exam practice. Assessment includes quizzes, assignments, a report, and midterm/final exams to ensure both continuous progress and mastery of outcomes.			

Module 2

Code	Course/Module Title	ECTS	Semester
KUS11002	Fundamentals of computer science	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
Fundamentals of Computer Science 1 (KUS11002) introduces first-semester students to the essential concepts and practical skills needed to use computers confidently and effectively. It explains the basics of computer systems, including hardware components, software types, and how data is represented and processed. Students learn how to work with operating systems and graphical user interfaces, including file management and everyday system tasks. The course develops strong digital productivity skills through hands-on practice with word processing, spreadsheets, and presentations (Word, Excel, PowerPoint). It also builds Internet literacy, covering web browsing, search engines, safe online behavior, and electronic communication such as email. Modern collaboration is emphasized through cloud computing tools and services (e.g., cloud storage and online teamwork platforms). In addition, students gain an introduction to Python programming, including core syntax, variables, control structures, data structures, and simple GUI concepts. Basic cybersecurity awareness and digital ethics are integrated to promote responsible and secure computing in academic and real-world contexts.			

Module 3

Code	Course/Module Title	ECTS	Semester
KUS11003	Democracy and Human Rights	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	17
Description			
Human Rights (KUS11003) is a foundational second-semester module that introduces students to the concept, nature, and core principles of human rights and why they matter in modern societies. It traces the historical development of human rights across different eras, helping students understand how these rights evolved and became recognized internationally. The course clarifies the distinction between human rights and other types of rights, and examines human rights perspectives within the Abrahamic religions and their influence on social life. Students also study how human rights are expressed in international charters and treaties, and how national legislation contributes to protecting these rights. Key categories of rights are covered, including personal, social, cultural, and economic rights, along with the international, regional, and national mechanisms that guarantee them. Finally, the module highlights legal consequences and sanctions associated with violations of human rights, using discussion, case studies, and interactive classroom approaches to strengthen understanding and practical awareness.			

Module 4

Code	Course/Module Title	ECTS	Semester
CEN11004	Engineering Drawing	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	48	77
Description			
Engineering Drawing (CEN11004) develops students' ability to communicate technical ideas clearly through precise graphical representation. The module introduces drawing instruments, sheet layout, and the use of BIS/ISO standards for lines, lettering, and dimensioning, then builds skill in geometric constructions such as tangents, polygons, and engineering curves. Students learn orthographic projection to produce accurate front, top, and side views, and practice deriving a missing view from two given projections. The course also covers sectional views and basic development of surfaces, supporting the interpretation of engineering components and assemblies. Visualization is strengthened through isometric and oblique/perspective-style 3D drawings using standard projection angles. Practical work is emphasized through weekly exercises, short tests, and drawing tasks, with assessment via quizzes, assignments/projects, and midterm/final exams.			

Module 5

Code	Course/Module Title	ECTS	Semester
CEN11005	Physics	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
Physics (CEN11005) is a first-semester foundational course that equips students with core physics concepts needed for engineering and cybersecurity-related hardware understanding, with strong emphasis on electricity and electronics. It begins with physical quantities, units, vectors, and dimensional analysis, then introduces electric charge, atomic structure, and types of matter, including charging methods and conservation of charge. The course develops electrostatics through Coulomb's law, electric forces, electric fields, field lines, dipoles, and electric potential energy. It then moves into circuit fundamentals, covering Ohm's law, resistance, capacitance, RC behavior, inductance, and basic AC circuit analysis, including reactance (XL, XC) and series/parallel connections. A major part of the module introduces semiconductor physics: energy bands, intrinsic vs extrinsic materials, carrier concentration, doping, and N-type/P-type behavior. Students study PN junction formation and biasing, diode characteristics (including Zener behavior), and practical diode applications such as rectifiers and voltage regulation. Learning is supported through lectures, tutorials, and laboratory experiments that test and verify circuit and semiconductor behavior using real measurements. Assessment combines quizzes, assignments, lab/project work, a report, and midterm/final exams to ensure both conceptual understanding and practical competence.			

Module 6

Code	Course/Module Title	ECTS	Semester
CYE11006	Biology	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	67
Description			
Biology (CYE11006) is a first-semester foundational module that introduces core biological concepts and connects them directly to cybersecurity applications, especially biometrics and identity verification. It covers the chemistry of life, biological molecules, cell structure and membranes, enzymes and biological reactions, cellular respiration and photosynthesis, and then moves to cell division, Mendelian genetics, genes and inheritance, and human genetics. Students study DNA structure, replication, and how genetic information is translated into proteins, alongside key cell transport processes (passive and active). A major focus is understanding how human biological structures generate biometric signals, and how modalities like fingerprints, iris/retina, voice, gait, and behavioral patterns vary across individuals. The course also explores human diversity and population genetics and how these can affect fairness, accuracy, and bias in biometric systems. Privacy, ethics, and security risks around collecting and storing biological/biometric data are emphasized, supported by real-world biometric security case studies.			

Module 7

Code	Course/Module Title	ECTS	Semester
CYE11007	Digital Logic Design	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
Digital Logic Design (CYE11007) introduces students to the fundamentals of digital electronics as a base for modern computing, embedded systems, and automation. The course starts by distinguishing analog vs. digital signals, then builds strong skills in number systems (binary, octal, decimal, hexadecimal) and binary arithmetic and conversions. Students study logic gates and truth tables, then apply Boolean algebra laws to simplify and optimize logic expressions. Combinational circuit design is emphasized using Karnaugh maps (K-Maps), leading to practical building blocks such as adders, sub tractors, multiplexers/DE multiplexers, encoders, and decoders. The module then moves to sequential logic, covering latches, flip-flops (SR, JK, D, T), timing concepts, counters, and shift registers. Lab work supports the theory through circuit construction, testing, and simulation tools, helping students translate designs into working implementations. By the end, students can integrate combinational and sequential logic to design basic control and decision circuits used in real systems.			

Module 8

Code	Course/Module Title	ECTS	Semester
CYE12008	Mathematics II	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
Mathematics II (CYE12008) builds on students' foundational mathematical knowledge by developing the analytical and problem-solving skills needed for engineering and technical study. The module introduces vector algebra and geometry, including lines, planes, angles, distances, and intersections, then extends to vector-valued functions, partial derivatives, gradients, and their applications. It also develops students' understanding of integration techniques, covering standard integration rules, trigonometric forms, substitution methods, and applications used in mathematical and engineering contexts. In addition, the course introduces matrices, determinants, and Cramer's rule as essential algebraic tools for solving systems and representing mathematical relationships. Through theory classes and tutorials, students strengthen their ability to analyze functions, apply calculus methods, and solve structured mathematical problems with accuracy and logical reasoning.			

Module 9

Code	Course/Module Title	ECTS	Semester
CYE11009	Networks Fundamentals	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
Networks Fundamentals (CYE11009) introduces first-year students to the essential concepts of computer networks and data communication, providing the foundation needed for later study in cybersecurity and network engineering. The module explains network types, architectures, and communication models, including client–server and peer-to-peer systems, and develops understanding of international networking standards and layered models such as OSI and TCP/IP. Students learn the principles of data communication, including signals, bandwidth, throughput, and latency, as well as the characteristics of transmission media, common network devices, and basic network topologies. The course also covers switching, routing, and network services, while highlighting how networking concepts relate to cybersecurity through attack surfaces, vulnerabilities, and the CIA triad. Practical learning is reinforced through hands-on activities and Packet Tracer-based labs in which students explore network components, simulate simple LANs, practice basic IP configuration, and observe connectivity and device behavior in controlled scenarios.			

Module 10

Code	Course/Module Title	ECTS	Semester
KUS12010	Arabic Language I	2	2

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	33	17
Description			
اللغة العربية (KUS12010) هي مادة تُعنى بتنمية قدرة طلبة المرحلة الأولى على استخدام اللغة العربية استخدامًا صحيحًا وسليمًا في الفهم والتعبير الشفهي والكتابي، بما يخدم مسيرتهم الجامعية وتواصلهم الأكاديمي والمهني. تركّز المادة على تقويم اللسان، وصقل المهارات اللغوية الأساسية، وتعزيز سلامة اللفظ والكتابة، إلى جانب ترسيخ القواعد النحوية والإملائية وعلامات الترقيم وأسس التعبير اللغوي الدقيق والموجز. كما تهدف إلى تطوير مهارات الطلبة في إعداد الكتب الرسمية، وكتابة التقارير والبحوث بصورة صحيحة ومنظمة، مع تعريفهم بجوانب من الأدب العربي وبعض الظواهر اللغوية والأساليب التعبيرية الشائعة. وتساعد المادة الطلبة على اكتساب مهارات عملية في تحرير النصوص وتصحيح الأخطاء اللغوية الشائعة، بما يعزز قدرتهم على إنتاج كتابة أكاديمية سليمة وواضحة وذات معنى متكامل.			

Module 11

Code	Course/Module Title	ECTS	Semester
KUS12011	English Language I	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	-	33	17
Description			
English I (KUS12011) introduces second-semester students to the basic English language knowledge and communication skills needed for academic study and future professional use in engineering contexts. Designed for beginner learners, the module develops core grammar and vocabulary while strengthening the four main language skills of reading, writing, listening, and speaking. Students practice understanding texts, identifying key information, summarizing ideas, paraphrasing content, and producing paragraphs, reports, and short presentations. The course also introduces commonly used every day English expressions and gradually connects language learning to engineering-related topics such as technical problems, procedures, design, materials, and resources. Through guided reading, writing tasks, class activities, and practical communication exercises, students build confidence in using English accurately and effectively in both general and engineering-oriented situations.			

Module 12

Code	Course/Module Title	ECTS	Semester
CYE12012	Electrical Circuits Analysis	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			

Electrical Circuits Analysis (CYE12012) introduces second-semester students to the fundamental principles of electrical circuit analysis that underpin later study in electrical, electronic, and computing-related systems. The module develops understanding of core electrical quantities such as charge, current, voltage, power, and energy, and explains the behavior and application of basic circuit elements. Students learn essential circuit laws and analysis techniques, including Ohm's law, Kirchhoff's current and voltage laws, series and parallel resistor networks, Wye–Delta transformations, nodal analysis, and mesh analysis. The course also introduces major circuit theorems such as superposition, source transformation, Thevenin's theorem, Norton's theorem, and the maximum power transfer theorem, with emphasis on structured problem solving and analytical reasoning. Practical laboratory work reinforces the theoretical content through measurement of voltage, current, power, and resistance, and through hands-on experiments in circuit construction, divider rules, circuit laws, and theorem verification using standard electrical laboratory instruments.

Module 13

Code	Course/Module Title	ECTS	Semester
CYE11014	Cybersecurity Fundamentals	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	77
Description			
Cybersecurity Fundamentals (CYE11014) introduces first-year students to the essential concepts, terminology, and defensive practices of cybersecurity, providing a foundational understanding for later study in the field. The module explains core security ideas such as the CIA triad, assets, threats, vulnerabilities, risks, and controls, and examines common threat actors, attack motivations, and attack types, with particular emphasis on phishing and social engineering awareness. Students are introduced to key security principles including least privilege, defense-in-depth, secure defaults, and attack surface reduction, as well as the basics of authentication, authorization, access control, and introductory cryptography concepts such as hashing, encryption, and digital signatures. The course also covers malware, endpoint protection, network defense fundamentals, logging and monitoring, software and operating system security basics, and introductory cloud and IoT security issues. Through lectures, tutorials, and controlled analytical activities, students develop practical awareness skills in recognizing suspicious activity, interpreting simple security artifacts, applying basic protection measures, and understanding incident reporting, risk assessment, and essential cybersecurity policies.			

Module 14

Code	Course/Module Title	ECTS	Semester
CYE11015	Computer Programming	7	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	63	112
Description			

Computer Programming (CYE11015) introduces first-semester students to the fundamental principles of computer programming through the C++ language, developing the problem-solving and coding skills needed for later study in computing and cybersecurity. The module explains the basic structure and syntax of C++ programs and introduces essential programming concepts such as variables, data types, constants, operators, input and output, and standard library usage. Students learn how to control program flow using conditional statements and looping structures, and they are introduced to arrays, strings, and the basic memory model underlying program execution. The course combines theoretical understanding with hands-on laboratory practice, enabling students to write, compile, test, and debug simple C++ programs in a structured programming environment. Through coding exercises, problem-solving activities, and guided lab work, students build a solid foundation for developing correct, organized, and efficient programs.

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