|  |  |
| --- | --- |
| P1 | Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions. |
| P2 | Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline. |
| P3 | Communicate effectively in a variety of professional contexts. |
| P4 | Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. |
| P5 | Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline. |
| P6 | Apply security principles and practices to maintain operations in the presence of risks and threats. |

|  |  |
| --- | --- |
| C1 | Demonstrate computational thinking skills to solve computing problems |
| C2 | Describe systems and components involved in building usable computing platforms |
| C3 | Identify different IT tools and techniques used in IT systems |
| C4 | Discuss IT related ethical issues |
| C5 | Translate a problem expressed in English, mathematics or a diagram to a computer program |
| C6 | Implement algorithms using programming constructs (variables, control structures, methods) |
| C7 | Solve problems using suitable data structures |
| C8 | Implement searching, summing and selecting algorithms |
| C9 | Design and implement algorithm to solve simple problems |
| C10 | Choose suitable data type to represent the information |
| C11 | Apply sequence, selection and repetition structures to solve problems |
| C12 | Design and implement programs containing many methods |
| C13 | Manipulate One-Dimension and Two-Dimension arrays |
| C14 | Use formal methods of symbolic propositions to evaluate elementary mathematical arguments and identify logical reasoning |
| C15 | Prove assertions using basic proof methods, (eg induction, contrapositive, contradiction, …etc) |
| C16 | Derive closed-forms of summations and recursive structures |
| C17 | Apply graph theory and trees models to solve problems of connectivity |
| C18 | Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, matrices and integers |
| C19 | Convert between different number systems and represent signed numbers in both 1's and 2's complement representation |
| C20 | Analyze combinational and sequential circuits |
| C21 | Design and implement combinational and sequential circuits |
| C22 | Define a modern computer system's major components, their functions and inter-relationships |
| C23 | Explain the memory hierarchy structure and the importance and characteristics of each level |
| C24 | Describe the components of the instruction sets and the different types of instructions and addressing modes |
| C25 | Explain the different concepts and functions of the physical layer |
| C26 | Apply different mechanisms of error control, flow control and medium access control at the data link layer |
| C27 | Explain the main functions of the network layer such as packet switching, IP addressing and fragmentation |
| C28 | Discuss the operations and functions of different Transport layer protocols |
| C29 | Implement classes to solve a given problem |
| C30 | Test simple classes |
| C31 | Design classes using existing classes and libraries |
| C32 | Develop a class hierarchy using inheritance |
| C33 | Develop classes for simple data structures |
| C34 | Design and implement small and medium size software problems using objects |
| C35 | Use Arrays and Array-Lists in solving problems |
| C36 | Implement user-defined classes to solve a given problem |
| C37 | Use predefined libraries to develop programs with graphical user interface |
| C38 | Develop a class hierarchy using inheritance |
| C39 | Apply project lifecycle processes to an IT project |
| C40 | Apply IT project techniques and tools to manage an IT project |
| C41 | Identify internal and external constraints of a given IT project |
| C42 | Produce documents typically used in the development of an IT project |
| C43 | Demonstrate verbal, and written communication skills as part of a team |
| C44 | Explain security policies, models, and mechanisms |
| C45 | Discuss operating system security models and mechanisms |
| C46 | Describe cryptographic techniques and their applications |
| C47 | Analyze security threats and vulnerabilities in computer systems |
| C48 | Define solutions to defend against viruses and other malicious programs |
| C49 | Explain the logical progression of operating system development |
| C50 | Explain the necessary components and structures of an operating system |
| C51 | Install and customize an operating system |
| C52 | Write simple shell scripts in operating systems |
| C53 | Evaluate various methods for process scheduling and inter-process communication |
| C54 | Explain file-system concepts and operations |
| C55 | Apply recursion to solve problems |
| C56 | Use APIs for implementing moderate size programs with data structures |
| C57 | Design and implement linear data structures |
| C58 | Design and implement tree data structures |
| C59 | Model and Solve problems using graphs |
| C60 | Describe the main concepts of a database system |
| C61 | Compare a database system approach to a file-based system approach |
| C62 | Design a database using the entity-relationship diagram (ERD) |
| C63 | Use Relational Algebra to perform various operations on relations |
| C64 | Apply normalization to database tables |
| C65 | Function effectively as a team to create and query a database |
| C66 | Analyze issues and case studies using ethical decision making based on a code of ethics and formal methods |
| C67 | Identify privacy, freedom of speech and crime issues in Cyberspace |
| C68 | Discuss intellectual property and software development issues |
| C69 | Discuss the implications of computing in the workplace on workers and employers |
| C70 | Discuss the socio-economic implications of online communities and the Digital Divide |
| C71 | Function in groups to assess current ethical issues and communicate the results in oral and written form |
| C72 | Describe the role and skills of an entrepreneur and cultivate an entrepreneurial mindset |
| C73 | Apply the process followed by an entrepreneur in selecting a valuable opportunity for an IT related business |
| C74 | Explain the principles and success factors of IT venture planning |
| C75 | Evaluate the viability of functional planning in IT ventures, considering key legal and intellectual property issues |
| C76 | Create a business model and financial plan for an IT venture |
| C77 | Identify the structure and operations of the workplace |
| C78 | Recognize the employee rights and responsibilities |
| C79 | Apply IT knowledge in the workplace |
| C80 | Function effectively, professionally and ethically on teams |
| C81 | Communicate effectively and technically orally and in writing |
| C82 | Recognize the need for continuing professional development |
| C83 | Discuss contemporary cryptography and its application |
| C84 | Apply hash function algorithms |
| C85 | Investigate the mathematical concepts required for cryptographic algorithms |
| C86 | Analyze security threats associated with cryptographic algorithms |
| C87 | Evaluate various cryptographic techniques |
| C88 | Analyze classic cryptographic algorithms |
| C89 | Implement symmetric cryptography techniques |
| C90 | Implement public-key cryptosystems techniques |
| C91 | Compare security properties of well-known cryptographic protocols |
| C92 | Implement an IPSec VPN solution for a small network |
| C93 | Describe TCP/IP protocols and common network services |
| C94 | Explain network traffic and service filtering concepts |
| C95 | Compare stateless and stateful firewalls |
| C96 | Assess firewall filtering rules consistency and efficiency |
| C97 | Discuss VPN and secure network architectures |
| C98 | Demonstrate teamwork skills |
| C99 | Describe the Internet and e-commerce security protocols |
| C100 | Analyze vulnerabilities associated with the insecure Internet and e-commerce protocols |
| C101 | Demonstrate how security protocols are used to achieve internet and e-commerce security |
| C102 | Communicate issues relevant to public-key infrastructure (PKI) |
| C103 | Explain the concept of trust (and trust models) on the internet using secure internet protocols |
| C104 | Discuss common security issues in software |
| C105 | Analyze software vulnerabilities |
| C106 | Explain secure software design & development techniques |
| C107 | Compare various software security testing tools and techniques |
| C108 | Analyze web application security threats and countermeasures |
| C109 | Discuss system security architectures concepts and their attributes |
| C110 | Design a secure information system using the OM-AM framework |
| C111 | Apply security access control models |
| C112 | Analyze security threats associated with information systems and their infrastructures |
| C113 | Select security countermeasures solutions |
| C114 | Evaluate biometric solutions and authentication protocols |
| C115 | Configure security features of network devices |
| C116 | Analyze common network threats and attack vectors |
| C117 | Apply attack mitigation techniques |
| C118 | Implement packet filters, stateful firewalls, and application layer firewalls |
| C119 | Analyze security incidents using intrusion detection and prevention systems |
| C120 | Evaluate operating systems security aspects |
| C121 | Configure biometric security systems |
| C122 | Implement lattice-based access control model |
| C123 | Design active response security architectures |
| C124 | Use digital forensics hardware and software tools |
| C125 | Analyze designing issues pertaining to information security policies |
| C126 | Investigate sociological and legal issues in policy implementations |
| C127 | Apply principles and philosophies which underlie successful information security governance |
| C128 | Discuss interactions between information security concerns and business objectives |
| C129 | Evaluate information security activities within the implementation of projects |
| C130 | Analyze common security threats and network attacks |
| C131 | Evaluate IPS attack signature rules |
| C132 | Compare appropriate countermeasures for common network attacks |
| C133 | Discuss system security auditing and vulnerability assessment |
| C134 | Demonstrate teamwork skills |
| C135 | Investigate privacy concerns in different contexts |
| C136 | Apply privacy protection solutions |
| C137 | Analyze shortcomings of existing privacy technologies and challenges to privacy protection |
| C138 | Discuss privacy legislation, policies and best practices in different contexts |
| C139 | Design an information security risk management program for an organization |
| C140 | Implement an information security risk management roadmap |
| C141 | Manage an information security risk assessment consulting contract |
| C142 | Compare risk assessment techniques |
| C143 | Discuss laws affecting digital forensics |
| C144 | Analyze concepts of computer digital forensics |
| C145 | Evaluate current computer digital forensics tools |
| C146 | Conduct software and hardware based digital forensic analysis |
| C147 | Evaluate web and cloud based digital forensic tools |
| C148 | Assess digital forensics on mobile devices and applications |
| C149 | Discuss security management policies and best practices |
| C150 | Analyze and implement Business Continuity Planning (BCP) and Disaster Recovery Planning (DRP) |
| C151 | Criticize legal and ethical implications on security management |
| C152 | Apply risk evaluation and mitigation strategies |
| C153 | Apply ISMS standards |
| C154 | Analyze risk management and auditing techniques |
| C155 | Assess vulnerabilities of a hardware device or system |
| C156 | Analyze attacks on hardware systems |
| C157 | Integrate hardware security measures as a design metric |
| C158 | Apply detection, prevention and isolation methods against hardware attacks |
| C159 | Evaluate security and trust of hardware systems |
| C160 | Describe database security models and architectures |
| C161 | Analyze security vulnerabilities in databases |
| C162 | Apply database security models and policies on modern databases |
| C163 | Discuss data and applications auditing procedures for database security |
| C164 | Compare various database security and defense mechanisms |
| C165 | Evaluate options for a needed security solution |
| C166 | Compare various security mechanisms |
| C167 | Apply current security solutions to address certain requirements |
| C168 | Analyze the performance of applied security solutions |
| C169 | Explain the basic principles of the data mining process |
| C170 | Prepare data for mining and exploration |
| C171 | Use data mining techniques and modern tools to discover trends and patterns in realistic datasets |
| C172 | Evaluate different data mining models/techniques with respect to their performance accuracy |
| C173 | Function on teams and communicate effectively in written and oral forms |