

SEVERN BUSINESS COLLEGE

SBC Level 5 Diploma of Higher Education in Computer Science

Course Handbook

Qualification
SBC Level 5 Diploma of Higher Education in Computer Science

Level
5

Total Qualification Time
2400

Credit Value
240

Aim of the Course
The Level 5 Diploma of Higher Education in Computer Science is designed to equip learners with advanced knowledge, technical expertise, and problem-solving skills required in the ever-evolving field of computing. The course covers fundamental and applied aspects of software development, data management, networking, cybersecurity, artificial intelligence, and professional practice. The course also covers fundamental and applied aspects of software development, data management, networking, cybersecurity, artificial intelligence, and professional practice. It emphasizes both theoretical foundations and practical applications, preparing learners for higher education progression or careers in the computing industry.

Assessment
Assessment is through practical assignments, with no exams - to more accurately reflect the real working environment.

Course Structure
Level 5 Diploma of Higher Education in Computer Science (240 credits)

STAGE A: Level 4 Certificate of Higher Education in Computer Science (120 credits)			
Unit number	**Units**	**Unit level**	**Unit credit**
1	Principles of Computer Science	4	20
2	Computer Systems and Networking	4	20
3	Database Design and Development	4	20
4	Software Engineering Practices	4	20
5	Web Development and Internet Technologies	4	20
6	Professional and Academic Skills in Computing	4	20

STAGE B: Level 5 Diploma of Higher Education in Computer Science (120 credits)			
Unit number	**Units**	**Unit level**	**Unit credit**
1	Advanced Programming Concepts	5	20
2	Database Systems and Data Management	5	20
3	Computer Networks and Cybersecurity	5	20
4	Software Engineering and Project Management	5	20
5	Artificial Intelligence and Machine Learning	5	20
6	Professional Practice and Emerging Technologies	5	20

Assessment Grades

Grade	**Marking Criteria**
Pass	All learning outcomes are achieved. All assessment criteria are met.
Fail	All learning outcomes are not achieved. All assessment criteria are not met.
No Marks	Plagiarism

UNIT SPECIFICATIONS

Unit Title
Principles of Computer Science

Level
4

Learning Time Hours
200

Credit Value

20

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand the fundamental concepts of computer science.	1.1 Explain key principles of algorithms and computational thinking. 1.2 Describe the role of data representation in computing. 1.3 Analyse the relationship between hardware, software, and systems.
2. Apply problem-solving techniques in computer science.	2.1 Identify appropriate problem-solving strategies for computing tasks. 2.2 Apply algorithmic design to solve a computational problem. 2.3 Evaluate the effectiveness of chosen solutions.
3. Demonstrate understanding of programming paradigms.	3.1 Compare different programming paradigms (e.g., procedural, object-oriented). 3.2 Apply a paradigm to solve a programming task. 3.3 Justify the choice of paradigm in a specific context.
4. Analyse the impact of computer science in society.	4.1 Discuss the ethical implications of computer use. 4.2 Explain legal and social considerations in computing. 4.3 Evaluate the future role of computer science in industry and society.

UNIT SPECIFICATIONS

Unit Title

Computer Systems and Networking

Level

4

Learning Time Hours

200

Credit Value

20

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand the components and functions of computer systems.	1.1 Explain the role of input, output, processing, and storage devices. 1.2 Describe operating system functions and architecture. 1.3 Analyse system performance factors.
2. Understand computer networking principles.	2.1 Explain network topologies, protocols, and standards. 2.2 Differentiate between LANs, WANs, and the Internet. 2.3 Evaluate the role of security in networking.
3. Configure and test basic computer networks.	3.1 Set up a small-scale network using appropriate hardware/software. 3.2 Troubleshoot common networking problems. 3.3 Evaluate network performance and efficiency.
4. Assess the role of emerging technologies in networks.	4.1 Identify current and emerging networking trends. 4.2 Explain the impact of cloud computing on networking. 4.3 Evaluate future networking developments.

UNIT SPECIFICATIONS

Unit Title

Database Design and Development

Level

4

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand principles of database systems.	1.1 Explain different types of databases. 1.2 Describe database architecture and models. 1.3 Analyse database use in organizations.
2. Design a relational database structure.	2.1 Apply normalization to design database tables. 2.2 Create an Entity-Relationship (ER) diagram. 2.3 Justify design choices.
3. Develop and implement database solutions.	3.1 Use SQL to create and manipulate database structures. 3.2 Apply queries to retrieve and update data. 3.3 Test and validate database functionality.
4. Evaluate database solutions.	4.1 Assess the efficiency of queries. 4.2 Evaluate security features in databases. 4.3 Recommend improvements to a database system.

UNIT SPECIFICATIONS

Unit Title
Software Engineering Practices

Level
4

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand software development lifecycles (SDLC).	1.1 Explain different software development methodologies. 1.2 Compare agile vs. traditional methods. 1.3 Analyse project requirements for methodology suitability.
2. Apply software design principles.	2.1 Create design documentation for software solutions. 2.2 Apply modular design techniques. 2.3 Justify design decisions.
3. Implement software applications.	3.1 Write clean and maintainable code. 3.2 Apply debugging and testing strategies. 3.3 Deploy a functioning software application.
4. Evaluate software engineering practices.	4.1 Assess code quality and maintainability. 4.2 Analyse project management techniques in development. 4.3 Recommend improvements for software development processes.

UNIT SPECIFICATIONS

Unit Title
Web Development and Internet Technologies

Level
4

Learning Time Hours
200

Credit Value
20

Unit aim
The aim of this unit is to enable learners to understand cyber security and the consequences and implications of inadequate cyber security. They will understand the key terminology and the motivations of good and bad actors. They will also investigate the advantages and disadvantages of security by design.

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand web technologies and standards.	1.1 Explain the structure of the World Wide Web. 1.2 Describe web standards and protocols. 1.3 Analyse the role of browsers and servers.
2. Design and develop web pages.	2.1 Create a responsive web layout using HTML and CSS. 2.2 Apply client-side scripting to enhance interactivity. 2.3 Evaluate usability and accessibility of web pages.
3. Implement server-side technologies.	3.1 Develop dynamic web content using server-side scripting. 3.2 Connect a website to a database. 3.3 Test and troubleshoot web applications.
4. Evaluate web development practices.	4.1 Assess security considerations in web development. 4.2 Analyse current trends in web technologies. 4.3 Recommend improvements for web-based systems.

UNIT SPECIFICATIONS

Unit Title
Professional and Academic Skills in Computing

Level
4

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Develop academic skills for computing study.	1.1 Apply referencing and citation techniques. 1.2 Write academic reports in a computing context. 1.3 Present technical information effectively.
2. Apply professional skills in computing.	2.1 Demonstrate effective teamwork in IT projects. 2.2 Apply communication skills in technical and non-technical contexts. 2.3 Evaluate personal strengths and weaknesses.
3. Understand the role of professionalism in IT.	3.1 Explain ethical issues in IT practice. 3.2 Analyse professional codes of conduct in computing. 3.3 Assess the impact of professional behavior in workplace scenarios.

4. Apply reflective practice to personal and academic development.	4.1 Create a personal development plan (PDP). 4.2 Reflect on own learning and skill acquisition. 4.3 Recommend strategies for continuous improvement.

UNIT SPECIFICATIONS

Unit Title
Advanced Programming Concepts

Level
5

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand principles of advanced object-oriented programming	1.1: Explain the concepts of inheritance, polymorphism, and encapsulation. 1.2: Apply OOP principles in designing modular programs. 1.3: Evaluate benefits and challenges of using OOP in software development.
2. Be able to implement data structures and algorithms.	2.1: Demonstrate use of arrays, linked lists, stacks, and queues. 2.2: Apply sorting and searching algorithms in solving computational problems. 2.3: Analyze efficiency of implemented algorithms.
3. Understand principles of functional and concurrent programming.	3.1: Explain the concepts of higher-order functions and immutability. 3.2: Implement concurrency using threads or asynchronous tasks. 3.3: Evaluate applications of functional programming in modern systems.
4. Be able to develop robust software applications.	4.1: Apply exception handling and error management strategies. 4.2: Demonstrate use of design patterns in application development. 4.3: Test and debug applications to ensure functionality and reliability.

UNIT SPECIFICATIONS

Unit Title
Database Systems and Data Management

Level
5

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand relational database design principles.	1.1: Explain the process of data normalization. 1.2: Design entity-relationship diagrams for a given scenario. 1.3: Evaluate benefits and limitations of relational databases.
2. Be able to implement and manage SQL databases.	2.1: Write SQL queries to retrieve, update, and manage data. 2.2: Implement stored procedures, triggers, and views. 2.3: Optimize queries for performance improvement.

3. Understand principles of NoSQL and big data systems.	3.1: Compare relational and non-relational databases. 3.2: Explain applications of NoSQL in big data environments. 3.3: Evaluate use cases for MongoDB, Cassandra, or similar systems.
4. Be able to apply data security and integrity measures.	4.1: Apply access control mechanisms in databases. 4.2: Demonstrate data backup and recovery strategies. 4.3: Assess ethical and legal considerations in data management.

UNIT SPECIFICATIONS

Unit Title
Computer Networks and Cybersecurity

Level
5

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand network models, protocols, and standards.	1.1: Explain the OSI and TCP/IP models. 1.2: Analyze the role of common network protocols. 1.3: Evaluate emerging trends in networking technologies.
2. Be able to configure and manage networks.	2.1: Configure routers, switches, and firewalls. 2.2: Demonstrate use of network monitoring tools. 2.3: Troubleshoot common networking issues.
3. Understand cybersecurity threats and vulnerabilities.	3.1: Identify different types of cyber threats and attacks. 3.2: Explain vulnerabilities within networked systems. 3.3: Evaluate implications of cyber threats for organizations.
4. Be able to apply cybersecurity defense mechanisms.	4.1: Implement encryption and authentication techniques. 4.2: Apply intrusion detection and prevention methods. 4.3: Develop policies for organizational cybersecurity.

UNIT SPECIFICATIONS

Unit Title
Software Engineering and Project Management

Level
5

Learning Time Hours
200

Credit Value
20

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand software development methodologies.	1.1: Compare waterfall, agile, and DevOps approaches. 1.2: Analyze benefits and drawbacks of iterative development.

	1.3: Evaluate methodology suitability for different project types.
2. Be able to apply software design principles.	2.1: Create UML diagrams to model software solutions. 2.2: Apply modular design and separation of concerns. 2.3: Evaluate importance of maintainability and scalability.
3. Understand project management processes.	3.1: Explain the project life cycle and key stages. 3.2: Apply project planning and scheduling techniques. 3.3: Evaluate tools for managing software projects.
4. Be able to manage and evaluate software projects.	4.1: Demonstrate leadership and teamwork in project execution. 4.2: Apply risk management techniques. 4.3: Evaluate project outcomes against initial requirements.

UNIT SPECIFICATIONS

Unit Title
Artificial Intelligence and Machine Learning

Level
5

Learning Time Hours
200

Credit Value
20

Unit aim
The aim of this unit is to enable learners to understand cyber security and the consequences and implications of inadequate cyber security. They will understand the key terminology and the motivations of good and bad actors. They will also investigate the advantages and disadvantages of security by design.

Learning outcomes and assessment criteria
In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand principles of artificial intelligence.	1.1: Explain different approaches to AI (rule-based, learning-based). 1.2: Analyze applications of AI in real-world contexts. 1.3: Evaluate ethical implications of AI technologies.
2. Be able to apply machine learning techniques.	2.1: Implement supervised learning algorithms (e.g., regression, classification). 2.2: Apply unsupervised learning techniques (e.g., clustering). 2.3: Evaluate performance of machine learning models.
3. Understand natural language processing and computer vision.	3.1: Explain core concepts in NLP and CV. 3.2: Demonstrate simple text or image processing applications. 3.3: Evaluate challenges and limitations of NLP and CV.
4. Be able to apply AI techniques to problem-solving.	4.1: Develop an AI solution for a given problem scenario. 4.2: Test and refine AI models using datasets. 4.3: Critically assess effectiveness of implemented AI solutions.

UNIT SPECIFICATIONS

Unit Title
Professional Practice and Emerging Technologies

Level
5

Learning Time Hours
200

Credit Value

20

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning Outcome	Assessment Criteria
1. Understand professional and ethical responsibilities in computing.	1.1: Explain codes of conduct in the IT profession. 1.2: Assess ethical implications of emerging technologies. 1.3: Evaluate importance of inclusivity and diversity in computing.
2. Be able to apply research and academic skills.	2.1: Demonstrate use of academic research methods. 2.2: Apply critical thinking in evaluating sources. 2.3: Produce structured academic or technical reports.
3. Understand impact of emerging technologies on society and business.	3.1: Explain trends in cloud computing, IoT, and blockchain. 3.2: Analyze social and business impacts of emerging technologies. 3.3: Evaluate opportunities and risks in adopting new technologies.
4. Be able to plan personal and professional development.	4.1: Assess current skills and competencies. 4.2: Develop a career development plan. 4.3: Reflect on professional growth and lifelong learning.

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