

SEVERN BUSINESS COLLEGE

SBC Level 6 Graduate Diploma in Computer Science

Course Handbook

Qualification
SBC Level 6 Graduate Diploma in Computer Science

Level
6

Total Qualification Time
1200

Credit Value
120

Aim of the Course
The Graduate Diploma in Computer Science is a Level 6 qualification designed for learners seeking to deepen their knowledge of computer science principles, modern computing technologies, and advanced problem-solving methods. This course blends theory with practice to equip learners with critical technical, analytical, and research skills relevant for professional roles or further postgraduate study.
Upon completion, learners will:

- Demonstrate a solid grounding in advanced computing concepts.
- Apply critical thinking and problem-solving skills to real-world computing challenges.
- Develop professional and transferable skills for IT, software development, and research contexts.

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

Course Structure

SBC Level 6 Graduate Diploma in Computer Science			
Unit number	**Units**	**Unit level**	**Unit credit**
1	Advanced Programming and Software Development	6	20
2	Data Structures, Algorithms and Computational Theory	6	20
3	Database Systems and Big Data Technologies	6	20
4	Computer Networks, Security, and Cloud Computing	6	20
5	Artificial Intelligence and Machine Learning	6	20
6	Research Methods and Project in Computer Science	6	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
Advanced Programming and Software Development

Level
6

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. Demonstrate understanding of	1.1 Explain object-oriented, functional, and concurrent programming approaches.

advanced programming concepts and paradigms.	1.2 Compare advantages and limitations of programming paradigms. 1.3 Analyse code snippets to identify programming approaches used. 1.4 Evaluate appropriateness of paradigms for specific applications.
2. Apply software development methodologies in practice	2.1 Explain Agile and DevOps methodologies. 2.2 Design a small project plan using Agile principles. 2.3 Implement version control in a development environment. 2.4 Evaluate the impact of methodology choice on project outcomes.
3. Design efficient, reusable, and scalable software solutions.	3.1 Apply design patterns in software architecture. 3.2 Optimise code for efficiency and scalability. 3.3 Test and debug software applications systematically. 3.4 Critically evaluate software against requirements.
4. Reflect on professional practice in software development.	4.1 Demonstrate effective teamwork in coding projects. 4.2 Apply ethical and professional standards in software development. 4.3 Communicate technical solutions effectively. 4.4 Reflect on strengths and areas for improvement in programming practice.

UNIT SPECIFICATIONS

Unit Title
Data Structures, Algorithms and Computational Theory

Level
6

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. Analyse and evaluate core data structures.	1.1 Compare efficiency of arrays, linked lists, stacks, and queues. 1.2 Implement advanced data structures (trees, graphs, hash tables). 1.3 Evaluate trade-offs in choosing data structures. 1.4 Optimise storage and retrieval in data-intensive applications.
2. Be Apply algorithmic design and analysis techniques.	2.1 Demonstrate use of sorting and searching algorithms. 2.2 Analyse algorithm efficiency using Big-O notation. 2.3 Implement recursive and iterative algorithm solutions. 2.4 Compare deterministic and non-deterministic algorithms.
3. Demonstrate understanding of computational theory.	3.1 Explain concepts of automata and formal languages. 3.2 Apply Turing machine concepts to problem-solving. 3.3 Distinguish between tractable and intractable problems. 3.4 Evaluate complexity classes (P, NP, NP-complete).
4. Solve practical computing problems using algorithms.	4.1 Identify appropriate algorithms for real-world problems. 4.2 Implement algorithms in a programming environment. 4.3 Test and optimise algorithmic solutions. 4.4 Evaluate solution performance under varying conditions.

UNIT SPECIFICATIONS

Unit Title
Database Systems and Big Data Technologies

Level
6

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. Demonstrate advanced knowledge of database models.	1.1 Explain relational, NoSQL, and distributed databases. 1.2 Compare schema design approaches for structured and unstructured data. 1.3 Apply normalisation techniques in database design. 1.4 Evaluate performance implications of different models.
2. Design and implement complex database solutions.	2.1 Develop ER models for business scenarios. 2.2 Implement SQL queries, triggers, and stored procedures. 2.3 Apply transaction management and concurrency control. 2.4 Test and refine database solutions against requirements.
3. Evaluate big data technologies and frameworks.	3.1 Explain principles of distributed storage and computing. 3.2 Demonstrate use of big data frameworks (e.g., Hadoop, Spark). 3.3 Compare big data platforms for scalability and efficiency. 3.4 Evaluate ethical issues in big data collection and use.
4. Apply database and big data solutions in practice.	4.1 Integrate SQL and NoSQL solutions for complex applications. 4.2 Implement data analytics using large datasets. 4.3 Evaluate performance of big data systems. 4.4 Present findings from data-driven decision-making projects.

UNIT SPECIFICATIONS

Unit Title
Computer Networks, Security, and Cloud Computing

Level
6

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. Analyse network architectures and protocols.	1.1 Compare LAN, WAN, and cloud-based networks. 1.2 Evaluate TCP/IP and OSI model layers. 1.3 Analyse routing and switching protocols. 1.4 Evaluate performance of network configurations.
2. Demonstrate knowledge of cybersecurity principles.	2.1 Explain encryption, authentication, and access control. 2.2 Evaluate common security threats and vulnerabilities. 2.3 Apply penetration testing techniques. 2.4 Develop a security policy for an organisation.
3. Apply cloud computing technologies.	3.1 Demonstrate knowledge of cloud service models (IaaS, PaaS, SaaS). 3.2 Deploy applications using cloud infrastructure. 3.3 Evaluate cost and scalability implications of cloud adoption. 3.4 Analyse risks and benefits of cloud migration strategies.
4. Integrate secure and scalable network solutions.	4.1 Design secure network architectures for enterprise use. 4.2 Implement firewalls, IDS/IPS, and VPNs. 4.3 Apply cloud-native security solutions.

	4.4 Evaluate effectiveness of implemented network solutions.

UNIT SPECIFICATIONS

Unit Title
Artificial Intelligence and Machine Learning

Level
6

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. Demonstrate understanding of AI foundations.	1.1 Explain core concepts of AI and intelligent agents. 1.2 Distinguish between symbolic and statistical AI approaches. 1.3 Evaluate ethical considerations in AI. 1.4 Analyse the impact of AI on society and industry.
2. Apply machine learning algorithms.	2.1 Implement supervised learning algorithms. 2.2 Apply unsupervised learning techniques. 2.3 Evaluate performance using metrics (accuracy, precision, recall). 2.4 Optimise models through parameter tuning.
3. Develop and test AI applications.	3.1 Build AI models using relevant libraries/tools (e.g., TensorFlow, PyTorch). 3.2 Train and validate AI models on datasets. 3.3 Deploy AI models for real-world applications. 3.4 Evaluate performance against baseline models.
4. Critically reflect on AI development and use.	4.1 Assess transparency and fairness in AI algorithms. 4.2 Evaluate the reliability of AI solutions in practice. 4.3 Reflect on challenges in AI adoption. 4.4 Propose improvements to existing AI solutions.

UNIT SPECIFICATIONS

Unit Title
Research Methods and Project in Computer Science

Level
6

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. Demonstrate knowledge of research principles.	1.1 Explain quantitative and qualitative research approaches. 1.2 Evaluate research methodologies in computer science. 1.3 Demonstrate knowledge of ethical research practices.

	1.4 Critically review academic sources.
2. Plan and design a research project.	2.1 Define a clear research problem. 2.2 Formulate aims, objectives, and hypotheses. 2.3 Design an appropriate research methodology. 2.4 Develop a detailed project proposal.
3. Conduct research and present findings.	3.1 Collect and analyse relevant data. 3.2 Apply appropriate analysis tools and methods. 3.3 Present results in a structured and coherent format. 3.4 Evaluate research findings against objectives.
4. Reflect on research practice and outcomes.	4.1 Evaluate challenges faced during research. 4.2 Demonstrate problem-solving in addressing limitations. 4.3 Reflect on strengths and areas for improvement. 4.4 Propose directions for future research.

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