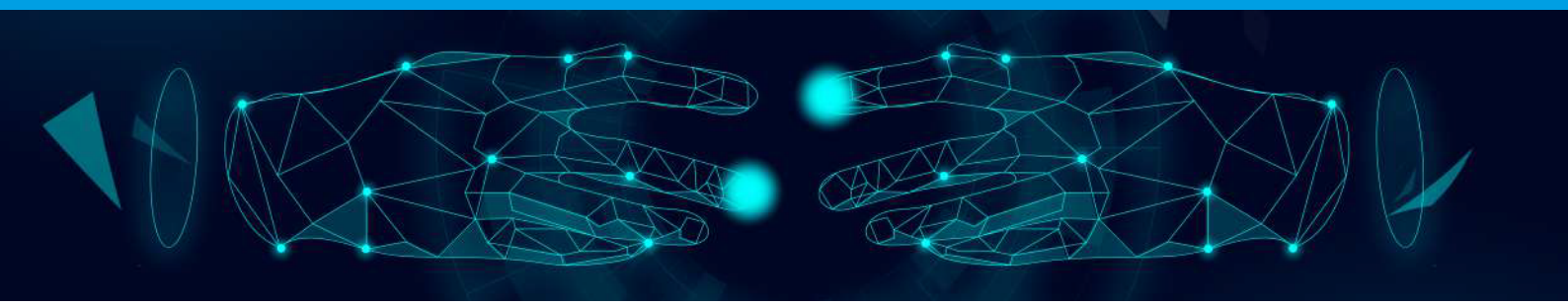
ICDL
The Digital Skills Standard

ICDL Arabia

EMERGING TECHNOLOGIES 2022

The Emerging Technology 2022 module introduces the emerging technologies that may have a substantial – and systemic- impact on our economies and societies. Covering Artificial Intelligence, Internet of Things (IoT), Big Data and Cloud Computing this module provides the conceptual understanding to allow managers who are not IT professionals to consider the potential of these technologies and have informed discussions with IT specialists or professionals.

Module Overview	
Unit	**Content**
Unit 1	• Artificial Intelligence (AI)
Unit 2	• Internet of Things (IoT)
Unit 3	• Big Data
Unit 4	• Cloud Computing



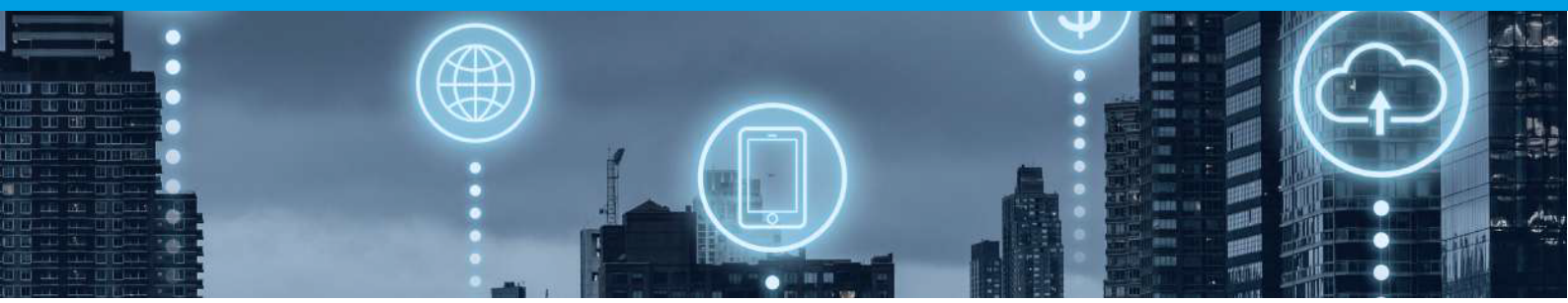
ARTIFICIAL INTELLIGENCE

Understand the potential of artificial intelligence (AI) – the intelligence demonstrated by a machine when it perceives its environment and takes actions that maximise the likelihood of achieving specific goals. By deploying the right AI technology, businesses and organisations can save time and money and can innovate by automating routine processes and tasks, increasing faster business decisions based on outputs from cognitive technologies.

On completion, candidates will be able to:

- Define Artificial Intelligence and recognise the stages and development milestones
- Understand how AI works, including the key principles underpinning AI
- Define the terms machine learning, neural network, and deep learning and the characteristics of each
- Identify the need for AI and recognise examples of how AI supports data mining, natural language processing, and decision making
- Recognise the limits, ethical guidelines, social and economic impact, as well as the potential and implications of AI

Unit 1	
Category	**Content**
What is Artificial Intelligence (AI)	• Define the term AI • Three stages of AI: narrow, general, super • Key milestones in the development of AI
How does AI Work	• Key principles underpinning AI: algorithms, complexity, heuristics • Machine learning definition and key characteristics • Neural network: definition and key characteristics • Deep learning: definition and key characteristics
Common AI Examples	• Identify the need for AI in organisations and society • Examples of how AI supports data mining • Examples of how AI supports natural language processing • Examples of how AI supports decision making
AI Adoption: Challenges and Potential	• Recognise limits to AI • Recognise ethical guidelines that should inform the operation of AI: clarity and desirability of purpose, transparency, competence in operations • Social and economic impact of AI • Potential & implications of AI for different sectors • Implications of adopting AI in a given scenario



INTERNET OF THINGS (IoT)

Understand IoT, which extends Internet connectivity from computers and related devices to other physical devices or common objects and leverages from technologies such as embedded systems, wireless sensors, and automation.

Over the last few years, there has been an explosion in the scale of the Internet of Things. Homes, offices, factories, and entire cities are being made "smart" by the proliferation of Internet-connected devices. Some estimates suggest that the number of connected IoT devices will reach 41.6 billion by 2025. Organisations and societies are only now starting to grasp the potential and implications of this trend.

On completion, candidates will be able to:

- Understand key concepts relating to Internet of Things (IoT), including common structure and requirements
- Recognise examples of consumer, commercial, industrial, and infrastructural applications of IoT
- Identify current trends in IoT, including the evolution of IoT components and the important role played by governance.
- Understand ethical, security, and interoperability considerations around adoption of IoT, and consider how IoT could be implemented in a given scenario
- Consider appropriate solutions and models for implementing cloud computing in a given scenario or situation

Unit 2	
Category	**Content**
• What is IoT?	• Define the term Internet of Things (IoT). • Recognise the common structure of an IoT system: application, data processing, network, sensing. • Identify physical components of an IoT system. • Identify processing requirements in an IoT system. • Recognise the origins and development of IoT.
• IoT Examples	• Recognise common examples of consumer and commercial IoT applications. • Recognise common examples of industrial IoT applications. • Recognise common examples of infrastructural IoT applications.
• Trends in IoT	• Recognise physical trends in the evolution of IOT like: miniturisation, ubiquity, scale. • Recognise the increasing role of governance in the design of IoT systems.
• IoT Adoption	• Understand key ethical considerations that must inform adoption of IoT systems like: decision making, privacy. • Understand security risks associated with adopting IoT systems. • Be aware of common interoperability challenges that may impact adoption of IoT systems. • Consider the possible structure of an IoT system that could be implemented in a given scenario.

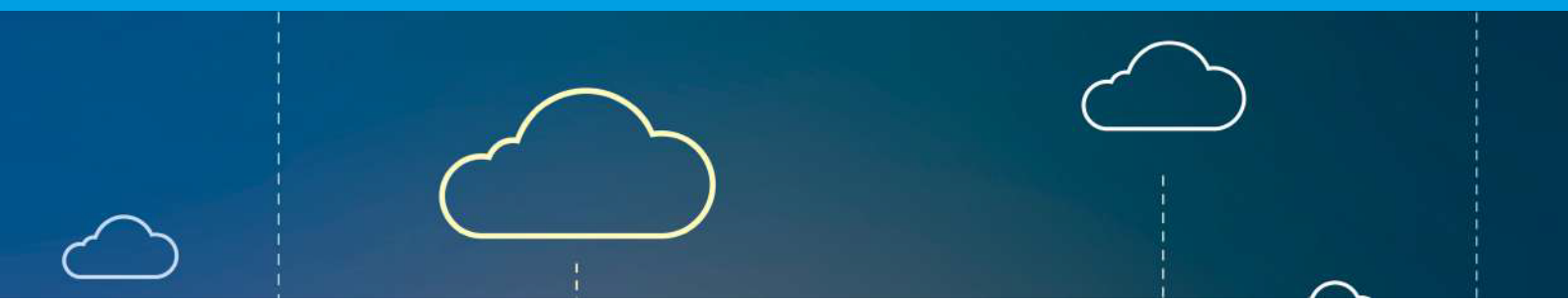
BIG DATA

Understand big data, a term which relates to the management and analysis of sets of data that are typically too large for traditional data-processing software. Most businesses and organisations deal with large volumes of data on a day-to-day basis, but is the potential of this data being fully exploited? Big data can be analysed for insights that lead to better decisions and strategic business initiatives.

On completion, candidates will be able to:

- Understand the term big data and its evolution, and recognise drivers behind its expansion
- Recognise key aspects of big data relating to storage technologies, analysis, and visualisation
- Recognise examples of big data implementation in a range of sectors
- Identify considerations for adoption of big data, including investment, practical challenges, business potential, and ethical issues
- Recognise steps for exploiting big data in a specific scenario or situation

Unit 3	
Category	**Content**
What is Big Data	• Definition of big data • Key stages in the evolution of big data. • Key characteristics of big data like: volume, velocity, variety, variability, veracity, value • Trends driving the expansion of data like: online, consumer and organisational actvity, IoT • Potential of big data for organisations
The Big Data Environment	• Common big data storage techniques and approaches to big data analysis • Common approaches to big data visualisation
Big Data in Practice	• Approaches to implementing big data in a variety of sectors
Big Data Adoption	• investment in resourc-es and competences • Challenges such as data quality and consistency, system compatibility • Potential of providing big data as a service, selling analysis • Ethical considerations such as governance, data protection • Steps for exploiting big data in a given scenerio



CLOUD COMPUTING

Understand Cloud Computing which is the use of Internet-connected remote servers to store, manage, and process data, instead of using local servers or computers. Cloud computing and cloud services are increasingly common technologies used by organisations to add flexibility, efficiency, and innovation. Many job roles in a range of sectors need to have an understanding of the potential of these technologies, as well as a grasp of the benefits and challenges associated with their adoption.

On completion, candidates will be able to:

- Understand key concepts relating to cloud computing
- Recognise the features, benefits, examples, and limitations of Infrastructure as a Service (IaaS)
- Recognise the features, benefits, limitations and provide examples of Platform as a Service (PaaS)
- Recognise the features, benefits, limitations and provide examples of Software as a Service (SaaS)
- Identify features and examples of Function as a Service (FaaS)
- Know about the different models for implementing cloud computing in organisations
- Consider appropriate solutions and models for implementing cloud computing in a given scenario or situation.

Unit 4	
Category	**Content**
• What is Cloud Computing?	• Define the term cloud computing. • Identify the origins of cloud computing. • Identify cloud computing's key services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).
• Infrastructure as a Service (IaaS)	• Identify the components, common examples, benefits and limitations of IaaS.
• Platform as a Service (PaaS)	• Identify the components, common examples, benefits and limitations of PaaS.
• Software as a Service (SaaS)	• Identify the components, common examples, benefits and limitations of SaaS.
• Serverless, Function as a Service (FaaS)	• Identify the features and purpose of and common examples of serverless solutions.
• Deployment Models	• Identify the features of private and public cloud models. • Identify the features of community and hybrid cloud models.
• Adoption	• Identify key challenges to adoption of cloud computing in an organisation. • Consider appropriate services and models for a given scenario.

Why certify with ICDL?

- ICDL certification is internationally recognised by employers and institutions.
- ICDL Emerging Technologies 2022 modules combine cutting-edge e-learning with a brief certification test to demonstrate your mastery of the relevant concepts and good practice.
- ICDL syllabus content is vendor-independent so that skills, knowledge, and competence are transferable.