



Unit title:	Knowledge-based Systems
Unit number:	22
Level:	5
Credit value:	15
Guided learning hours:	60
Unit reference number:	J/601/0459

UNIT AIM AND PURPOSE

This unit introduces the learner to knowledge-based systems and their applications. By developing their understanding of knowledge systems and their relationship with artificial intelligence, learners will develop a knowledge-based application.

LEARNING OUTCOMES AND ASSESSMENT CRITERIA

A pass grade is achieved by meeting **all** the requirements in the assessment criteria.

Learning Outcome (LO) The Learner will:	Pass The assessment criteria are the pass requirements for this unit. The Learner can:
LO1 Understand knowledge-based systems	1.1 analyse a real-world knowledge-based system, detailing: <ul style="list-style-type: none">• data, rules and structure• how the knowledge is managed• how artificial intelligence traits are incorporated into the system• how an expert system is created from utilising the knowledge base and including AI traits.
LO2 Be able to design knowledge-based applications	2.1 plan the design of an application using an AI development language 2.2 identify the screen components and data and file structures required to implement a given design 2.3 design knowledge base, rules and structure of the application
LO3 Be able to develop knowledge-based applications	3.1 implement the application 3.2 implement data validation for inputs 3.3 identify and implement opportunities for error handling and reporting 3.4 design and implement a test strategy 3.5 create documentation to support users

GRADING CRITERIA

A merit grade is achieved by meeting **all** the requirements in the pass criteria **and** the merit descriptors.

A distinction grade is achieved by meeting **all** the requirements in the pass criteria **and** the merit descriptors **and** the distinction descriptors.

Merit Criteria (M1, M2, M3)	Distinction Criteria (D1, D2, D3)
(M1, M2, and M3 are mandatory to achieve a merit grade. Each must be achieved at least once per unit to achieve a merit grade.)	(D1, D2, and D3 are mandatory to achieve a distinction grade. Each must be achieved at least once per unit to achieve a distinction grade.) (In order to achieve a distinction grade, all merit criteria must also have been achieved.)
MANDATORY TO ACHIEVE A MERIT GRADE	MANDATORY TO ACHIEVE A DISTINCTION GRADE
M1 Analyse concepts, theories or principles to formulate own responses to situations.	D1 Evaluate approaches to develop strategies in response to actual or anticipated situations.
M2 Analyse own knowledge, understanding and skills to define areas for development.	D2 Evaluate and apply strategies to develop own knowledge, understanding and skills.
M3 Exercise autonomy and judgement when implementing established courses of action.	D3 Determine, direct and communicate new courses of action.

TEACHING CONTENT

The Teaching Content describes what has to be taught to cover **all** Learning Outcomes.

Learners must be able to apply relevant examples to their work although these do not have to be the same as the examples specified.

LO1 Understand knowledge-based systems	
Knowledge-based systems	Components of a system (data, rules and structures), examples of systems in medicine, manufacturing, education and business
Knowledge management	Techniques (e.g. state space search, search techniques, heuristic search methods)
Artificial intelligence	Symbolic reasoning, no algorithmic solution or not practical, semantic meaning, domain-specific knowledge bases
Expert systems	Inference rules, architecture, people using the system such as end user or programmer, application areas.
LO2 Be able to design knowledge-based applications	
AI development language	Language skills for the language used, e.g. POP-11, Lisp, Prolog
Components	As necessary for chosen language using a range of techniques to review applications
Design	As necessary, for example frames, nets and inheritance.
LO3 Be able to develop knowledge-based applications	
Applications	Any suitable application, e.g. modelling, recognition, identification, use of a system/shell as a framework
Use of AI language	Any suitable language available to learners such as POP-11, Lisp, Prolog
Testing	Planning, strategy, test plan, test results
Documentation	User documentation which adheres to set industry standards.

GUIDANCE

Delivery guidance

It will be beneficial to deliver this unit in a way that uses actual events, industry forecasts or sector specific contexts which offer the learner the opportunity to explore, develop and apply the fundamental principles of the sector or subject area. Typical delivery contexts could include case studies relating to the use of knowledge-based systems. LPA Prolog (www.lpa.co.uk), for example, has a number of application briefs.

Learners will benefit from being encouraged to exercise autonomy and judgement to design a knowledge-based application, adapt their thinking and reach considered conclusions when developing a knowledge-based application.

Learners would benefit from being presented with subject/sector-relevant problems from a variety of perspectives and from being given the opportunity to explore them using a variety of approaches and schools of thought.

Assessment evidence guidance

Evidence must be produced to show how a learner has met each of the Learning Outcomes. This evidence could take the form of assignments, project portfolios, presentations or, where appropriate, reflective accounts.

Where group work/activities contribute to assessment evidence, the individual contribution of each learner must be clearly identified.

All evidence must be available for the visiting moderator to review. Where learners are able to use real situations or observations from work placement, care should be taken to ensure that the record of observation accurately reflects the learner's performance. This should be signed, dated, and included in the evidence. It is best practice to record another individual's perspective of how a practical activity was carried out. Centres may wish to use a witness statement as a record of observation. This should be signed and dated and included in the evidence.

RESOURCES

Books

Negnevitsky, *Artificial Intelligence A Guide to Intelligent Systems*, Pearson, 2011.

Bratko, *Prolog Programming for Artificial Intelligence*, Pearson, 2011.

Journals

Knowledge-Based Systems, www.journals.elsevier.com/knowledge-based-systems/

Websites

Logic Programming Associates Ltd, www.lpa.co.uk/