Unit 50: Systems Analysis and Design

Unit code: F/601/7278

QCF Level 3: BTEC Specialist

Credit value: 10

Guided learning hours: 60

Aim and purpose

The aim of this unit is to enable learners to gain an understanding of the principles of systems analysis and equip them with the skills to analyse business requirements and design solutions to meet business needs.

Unit introduction

Systems analysis informs the development of large or small, but often complex systems and the interactions within those systems. It provides structured processes that help to ensure designs are reliable.

In this unit, learners will gain an understanding of the principles and stages involved in systems analysis and the associated documentation involved in both the analysis and design stages. One key stage involves the determination of requirements and the writing of the requirements specification. Clear statements and understanding of the requirements are essential to ensuring that an appropriate solution is designed. In addition, the specification will provide the basis for later testing and evaluation.

The unit looks at why organisations undertake systems analysis as well as the benefits of carrying out such a formal process. A wide variety of methodologies are used, however they are all based on similar fundamental principles.

Learners will become familiar with a limited number of life cycle models and the associated terminology involved in the analysis and investigation of a system.

Learners will develop a detailed knowledge and understanding of different methodologies and their benefits and uses in particular situations.

It is expected that learners will undertake an actual systems analysis and design activity. It is not expected, however, that learners will create the system or test it as part of this unit. Other units can be linked to this unit to carry through the design work to the implementation stage.

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.

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand the principles of systems analysis and design	1.1 outline the principles of systems analysis 1.2 illustrate the stages of a development life cycle 1.3 explain the benefits of structured analysis
2 Be able to carry out a structured analysis of business systems requirements	2.1 carry out a structured analysis of a specified business process 2.2 produce a requirements specification for a business process
3 Be able to design business systems solutions	3.1 produce a design for a specified system requirement

Unit content

1 Understand the principles of systems analysis and design

Principles: development life cycle models; developmental tools and techniques; key drivers

Development life cycle models: Waterfall; other eg Spiral, Rapid Applications Development (RAD); benefits; stages eg initiation and feasibility, investigation, requirements analysis and specification, design (logical and physical), build systems, testing, implementation, maintenance

Developmental tools and techniques: any contemporary methodology for systems analysis and design; typical eg activity diagrams, dataflow diagrams, computer-aided software engineering tools (CASE)

Key drivers: business need, eg need for growth, company acquisition, need to increase productivity, legal requirements

Structured analysis: benefits eg reduced risk of projects running over-budget or over time, good quality software that meets requirements, manageable projects, maintainable systems and code, resilient systems

2 Be able to carry out a structured analysis of business systems requirements

Investigation: techniques eg interview, questionnaire, meeting, observation, document analysis, data analysis; sensitivity in collecting information and observing individuals at work

Analysis: as related to the chosen methodology; cost benefit analysis

Requirements specification: contents eg scope, inputs, outputs, processes, costs and benefits, recommendations, alternative solutions

3 Be able to design business systems solutions

Design: inputs and outputs eg screens and report design; data eg data flow diagrams, data dictionaries, entity relationship diagrams; process descriptors eg decision tables, flow charts, structured English

Constraints: on the design eg costs, organisational policies, timescale, legacy systems, available hardware platforms

Essential guidance for tutors

Delivery

Emphasis should be placed on developing learners understanding the role and principles of systems analysis and design, including the creation of clear documentation and the reasons behind the development of life cycle methodologies. Systems analysis is a hard concept for learners to grasp and without an understanding of why it is necessary for example, to carry out a cost benefit analysis or produce a data flow diagram; learning can become unrelated and 'difficult'.

Unless the centre has access to a variety of employers who can provide opportunities and information that can be used for assessment purposes, it is likely that much of the learning will be based on case studies. Where possible, case studies should be detailed and learners should be able to pose questions that allow them to gain further insights and access the higher grades.

A 'bite size' approach could work well, although a general overview of the whole process should be used to introduce the subject. The individual elements of the systems life cycle can then be covered. Some theory about different models and methodologies needs to be included but although it is the first learning outcome it may be more meaningful to leave this until the end of the practical work when learners will have had experience of using one model and methodology.

Learners will need to practise for all stages and a sufficient amount of time should be allocated. While the stages beyond design should be covered as outlined in the unit content, these elements are not assessed. Assessment of building and testing systems them occurs in other units.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments. The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to the unit
Principles of systems analysis and design: • whole-class exercise – tutor presentation giving an overview of stages ie investigation (interview etc); feasibility study; requirements analysis; system specification (design); system build (software solution); testing; implementation; maintenance • a mixture of tutor led sessions, directed learning and talks.
Structured analysis: • whole-class exercise – tutor presentation on investigation, followed by individual exercise • whole-class exercise – tutor presentation on feasibility study and requirements analysis, followed by individual exercise • a mixture of tutor-led and directed learning, case studies, role-play, speakers.
Assignment 1 – What Is Systems Analysis**?**
Principles of systems analysis and design 2: • whole-class exercise – tutor presentation on systems specification, followed by individual exercise • whole-class exercise – tutor presentation on documentation (DFDs, structured English etc), followed by individual exercise • whole-class exercise – tutor presentation on constraints, followed by individual exercise • a mixture of tutor led and directed learning, case studies, active learning exercises.

Topic and suggested assignments/activities and/assessment
Assignment 2 – What Do We Need?
Models and methodologies: • individual exercise – directed research into life cycle models • individual exercise – directed research into tools and techniques • group exercise – discussion on reasons and benefits • a mixture of tutor led and directed learning, case studies, active learning exercises.
Assignment 3 – And the Solution Is…

Assessment

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments programme of suggested assignments table.

Learners will need a scenario or case study detailing an organisation's (real or invented) activities. It is important that the scenario is as broad as possible to enable learners to meet all the assessment criteria. If at all feasible it would be beneficial for to carry out their own research with a suitable organisation.

The scenario suggested here is that of a small delivery business whose database system is outdated and staff have reverted to semi-manual systems. Deliveries are being delayed or, worse, completely missed. The business has employed a systems analyst to investigate the requirement and design a system to meet these needs.

Suggested Assignment 1 – What Is Systems Analysis?

The suggested scenario for this theoretical element of the assessment is a presentation to a group of new BTEC IT learners to introduce the subject of systems analysis. Learners need not deliver the presentation, indeed it may be produced as a self-running or interactive presentation, as long as the content is clear and sufficient and meets the grading criteria.

1.1 requires an explanation of the principles of systems analysis and the unit content will inform the content. For 1.2, learners need only outline the stages of one development life cycle.

In explaining the benefits of systems analysis for 1.3, learners should start with the key drivers and use the unit content as a guide.

Suggested Assignment 2 – What Do We Need?

For 2.1, it is expected that learners will have used appropriate techniques to gather the information they need to produce a requirements specification. A scenario that allows for the gathering of multiple responses (eg a customer or staff survey) would enable learners to develop questionnaires as well as using interviews. Evidence can be in the form of witness statements, interview notes and completed questionnaires.

2.2 is the requirements specification. This will contain elements as appropriate to the chosen methodology and must give a clear picture of the inputs, outputs, processes, scope and constraints of the system requirement, with a recommended solution.

Suggested Assignment 3 – And the Solution Is…

Following the requirements analysis, learners must now produce detailed design documentation. Again this will depend on the methodology used and may include, for example, data flow diagrams, ERDs, top-down design, structured English. For 3.1, it should be clear from the documentation how a basic solution would be implemented.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass criteria in the outcomes and assessment grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment methods
1.1, 1.2, 1.3	What is Systems Analysis?	Explain to a new group of BTEC IT learners what systems analysis is all about.	Presentation. Handouts.
2.1, 2.2	What Do We Need?	A small delivery business needs a new database system. You have been asked to investigate and document the system requirement.	Feasibility report/ requirements specification (or similar). Witness statements. Observation records.
3.1	And the Solution Is…	Following the initial investigation and approval of your recommendation by the business managers, you are to produce detailed design documentation.	Design documentation eg DFDs, ERDs.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC in IT sector suite.

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 3 National Occupational Standards for IT (ProCom):

4.4 Systems Analysis

5.1 Systems Development.

Essential resources

Learners will need access to industry standard software, plus hardware capable of running the software (including a printer).

Indicative reading for learners

Textbooks

Dennis A and Wixom B – *Systems Analysis and Design, 4th Edition* (John Wiley and Sons, 2009) ISBN-10 0470400315, ISBN-13 978-0470400319

Yeates D and Wakefield T – *Systems Analysis and Design, 2nd Edition* (FT Prentice Hall, 2003) ISBN-10 0273655361, ISBN-13 978-0273655367

Websites

www.freetutes.com/systemanalysis

www.tutorialized.com/view/tutorial/Systems-Analysis/31659

Functional Skills – Level 2

Skill	When learners are …
ICT - Using ICT	
Plan solutions to complex tasks by analysing the necessary stages	carrying out a structured analysis of a specified business process
Delect, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	generating design documentation
ICT - Finding and selecting information	
Use appropriate search techniques to locate and select relevant information	researching models and methodology
ICT - Developing, presenting and communicating information	
Use appropriate software to meet the requirements of a complex data-handling task	producing a design for a specified system requirement
Combine and present information in ways that are fit for purpose and audience	generating comprehensive design documentation independently
English - Reading	
Select, read, understand and compare texts and use them to gather information, ideas, arguments and opinions	carrying out a structured analysis of a specified business process
English - Writing	
Write a range of texts, including extended written documents, communicating information, ideas and opinions, effectively and persuasively	outlining the principles of systems analysis illustrating the stages of a development life cycle explaining the benefits of structured analysis explaining any constraints on the system design.