

Cambridge **TECHNICALS LEVEL 3**

Cambridge
TECHNICALS
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IT

Unit 11
Systems analysis and design

J/507/5012

Guided learning hours: 60

Version 1 September 2015

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Guided learning hours: 60

Essential resources required for this unit: Learners must have access to detailed case studies or current involvement with a systems development opportunity.

This unit is internally assessed and externally moderated by OCR.

UNIT AIM

All organisations have information systems. This unit will provide you with the knowledge and skills to support the design of formal information systems. These systems provide useful reliable, validated information through the integration of data, hardware, software and humans into processes which enable the organisation to meet its internal goals and its external obligations.

IT technicians are involved in the implementation of systems that have been designed and in many instances assist in their design. Emerging technology practitioners also have to have a knowledge and understanding of how to analyse and design systems that are supported by emerging technologies such as virtual and augmented reality, mobile technologies and the Internet of Everything. In order to effectively develop systems for analysis, it's important to have an understanding of the role of the data analyst and the tasks that they carry out. Data analysts also benefit from having an overview of systems analysis and design in order to support the development of suitable systems on which to work.

This unit is in the IT Infrastructure Technician specialist pathway as well as in the Emerging Digital Practitioner and Data Analyst Specialist pathways.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades.

Anything which follows an i.e. details what must be taught as part of that area of content. Anything which follows an e.g. is illustrative, it should be noted that where e.g. is used, learners must know and be able to apply relevant examples in their work, although these do not need to be the same ones specified in the unit content.

For internally assessed units you need to ensure that any assignments you create, or any modifications you make to an assignment, do not expect the learner to do more than they have been taught, but must enable them to access the full range of grades as described in the grading criteria.

Learning outcomes	Teaching content
The Learner will:	Learners must be taught:
1. Understand the role of systems analysis and design in relation to the systems development lifecycle	1.1 The components of the systems development lifecycle, i.e.: <ul style="list-style-type: none"> • feasibility study: <ul style="list-style-type: none"> ○ financial aspects including cost benefit analysis ○ business aspects ○ technical aspects ○ outcomes e.g. constraints, functional and non-functional requirements • requirements engineering (i.e. business and user): <ul style="list-style-type: none"> ○ requirements gathering (e.g. ideas, concerns) ○ requirements analysis (i.e. sensible, achievable, affordable) ○ requirements sign off ○ requirements monitoring (i.e. avoiding mission creep) • system design including virtualisation: <ul style="list-style-type: none"> ○ capacity ○ performance ○ throughput • software development • testing of the software • systems testing • implementation 1.2 Life cycles, i.e.: <ul style="list-style-type: none"> • linear (e.g. waterfall, v model, incremental) • evolutionary (e.g. iterative, spiral) • agile (e.g. scrum, Agile Unified Process (Agile (UP)))

Learning outcomes	Teaching content
The Learner will:	Learners must be taught:
2. Be able to use investigative techniques to establish requirements for business systems	<p>2.1 Business requirements, i.e.:</p> <ul style="list-style-type: none"> • business systems (e.g. human resources, finance, catering, production) • business analysis processes and models • identify business requirements • deliverables from business analysis <p>2.2 Techniques, i.e.:</p> <ul style="list-style-type: none"> • interviewing stakeholders • conducting workshops (e.g. facilitation, goal definition, selection of appropriate stakeholders) • holding focus groups • observing worker activities • shadowing workers • preparing and distributing questionnaires and surveys to stakeholders • analysing current documents • identifying deliverables
3. Be able to develop and document models for business systems	<p>3.1 The three view approach, i.e.:</p> <ul style="list-style-type: none"> • functionality: <ul style="list-style-type: none"> ○ data flow diagrams (DFDs) ○ flow charts ○ Jackson Structure Chart • static data: <ul style="list-style-type: none"> ○ Entity Relationship Diagram (ERD) ○ hierarchical tree diagram ○ bubble diagram • events: <ul style="list-style-type: none"> ○ Entity Life History (ELH) <p>3.2 Unified Modelling Language (UML) i.e.:</p> <ul style="list-style-type: none"> • use case diagram • activity diagram • interaction diagram: <ul style="list-style-type: none"> ○ sequence diagram ○ communication diagram ○ timing diagram ○ interaction overview diagram
4. Be able to create logical and physical designs for specified business systems	<p>4.1 Logical design, i.e.:</p> <ul style="list-style-type: none"> • platform independent • inputs • outputs • processes • data <p>4.2 Physical design, i.e.:</p> <ul style="list-style-type: none"> • platform dependent • hardware, e.g. Intel, AMD, HP, Sun, Apple, IBM • software, e.g. operating systems, Java, .Net Framework • implementation environment, e.g. web browser

Learning outcomes	Teaching content
The Learner will:	Learners must be taught:
	<p>4.3 Refining designs based on stakeholder feedback, i.e.:</p> <ul style="list-style-type: none">• analyse the feedback:<ul style="list-style-type: none">○ identify types of problems○ determine consistency of comments• decision on whether the refinements are viable• make changes to design in line with feedback and viability considerations

GRADING CRITERIA

LO	Pass	Merit	Distinction
	The assessment criteria are the Pass requirements for this unit.	To achieve a Merit the evidence must show that, in addition to the pass criteria, the candidate is able to:	To achieve a Distinction the evidence must show that, in addition to the pass and merit criteria, the candidate is able to:
1. Understand the role of systems analysis and design in relation to the systems development lifecycle	P1: Summarise the main components of the systems development life cycle	M1: Compare and contrast a range of systems development life cycles	
2. Be able to use investigative techniques to establish requirements for business systems	P2: Explore the business requirements for an identified business system P3: Use different techniques to support the analysis of the identified business system		
3. Be able to develop and document models for business systems	P4: Use the three view approach to document the design model for the identified business system	M2: Develop a set of Unified Modelling Language (UML) diagrams for the identified business system	D1: Evaluate the design model for the identified business system against original business requirements
4. Be able to create logical and physical designs for specified business systems	P5*: Create a logical design for the identified business system (*Synoptic assessment from Unit 1 Fundamentals of IT, Unit 2 Global information and Unit 3 Cyber security) P6: Create a physical design for the identified business system	M3: Present the logical and physical designs for the identified business system to relevant stakeholders	D2: Refine the logical and physical designs for the identified business system incorporating any stakeholder feedback

SYNOPTIC ASSESSMENT

When learners are taking an assessment task, or series of tasks, for this unit they will have opportunities to draw on relevant, appropriate knowledge, understanding and skills that they will have developed through other units. We've identified those opportunities in the grading criteria (shown with an asterisk). Learners should be encouraged to consider for themselves which skills/knowledge/understanding are most relevant to apply where we have placed an asterisk.

ASSESSMENT GUIDANCE

Wherever possible the use of case studies or real work opportunities should be used to provide the opportunity for assessment. It is possible to use local examples such as a centre's functional area's information systems and requirements e.g. a new canteen information system or improvements to the library system.

A report should be presented with a title, section headings e.g. introduction, methodology, findings, conclusions and recommendations and page numbers. A report template could be provided as in most organisations, at this level, technicians would be expected to follow the organisational paperwork.

Learners are encouraged to use the Command Verb Definition Document to help them understand the requirements of the assessment. This document may be downloaded from the OCR website.

LO1 Understand the role of systems analysis and design in relation to the systems development lifecycle

P1: Learners must be able to summarise the main elements of the systems development life cycle and how they are linked. The position of analysis and design within the life cycle must be clearly described. The evidence could take the form of a recorded presentation by learners to a group, a presentation with detailed speaker notes or a written report. An essay is not appropriate.

M1: Learners should compare and contrast at least three different life cycles, only one of which should be from the linear range. They must consider the differences and similarities of the methods and how they influence the choice of lifecycle for a given business system. The evidence could be presented as a report or a presentation with detailed speaker notes. Learners could also record their presentation.

LO2 Be able to use investigative techniques to establish requirements for business systems

P2: Learners must have access to a live systems development or a detailed scenario or case study which will enable them to carry out a thorough study of the business requirements for the system. They must have sufficient information to enable them to explore a range of business documentation and stakeholder views. This may include oral or written statements and questions from stakeholders, financial reports, press cuttings, incident reports, organisational goals and objectives, interview notes or live interviews of interested parties. The evidence must be formally presented either as a report or a detailed presentation, with speaker notes.

P3: This should be conducted alongside the study of the scenario in P2, as the activities should be recorded using at least three different examples of the techniques identified in the teaching content.

LO3 Be able to develop and document models for business systems.

P4: Learners must use the three view approach covering functionality, static data and events to provide a suitable design model of the requirements for a specified business system which may be that used for P2 and P3.

M2: Learners should convert the design model from P4 into a set of UML diagrams which must include at least one Use case diagram, one activity diagram and two interaction diagrams.

D1: Learners must communicate their design model to at least two stakeholders, one internal and one external. The communication can take the form of a report, a detailed presentation with comprehensive speaker notes or a video presentation.

LO4: Be able to create logical and physical designs for specified business systems

P5: Learners must create a logical design using appropriate diagramming techniques which are suitably annotated to provide a rationale for the stakeholders to consider.

P6: Learners must create a physical design using suitable diagramming techniques; diagrams should be annotated to provide a rationale for the stakeholders to consider.

M3: Learners are required to present their designs from P5 and P6 to the stakeholders for consideration. The evidence could take the form of a detailed report including the diagrams created, a presentation with detailed notes which also includes the diagrams, or a recording of learners presenting their findings to the stakeholders.

D2: Learners are required to analyse their logical and physical designs, including any stakeholder feedback. The learners will need to show how they have considered the feedback and evaluated the designs themselves, and will need to confirm on what basis they have refined their designs. The evidence will be the record of any feedback, the outcomes of the analysis of the feedback along with learners' own evaluation of the designs. This will be supported by the revised logical and physical designs and the rationale for the refinements made.

Feedback to learners: you can discuss work-in-progress towards summative assessment with learners to make sure it's being done in a planned and timely manner. It also provides an opportunity for you to check the authenticity of the work. You must intervene if you feel there's a health and safety risk.

Learners should use their own words when producing evidence of their knowledge and understanding. When learners use their own words it reduces the possibility of learners' work being identified as plagiarised. If a learner does use someone else's words and ideas in their work, they must acknowledge it, and this is done through referencing. Just quoting and referencing someone else's work will not show that the learner knows or understands it. It has to be clear in the work how the learner is using the material they have referenced **to inform their** thoughts, ideas or conclusions.

For more information about internal assessment, including feedback, authentication and plagiarism, see the centre handbook. Information about how to reference is in the OCR *Guide to Referencing* available on our website: <http://www.ocr.org.uk/i-want-to/skills-guides/>.

EMPLOYABILITY SKILLS

Employability skills	Learning outcome
Communication	P1, P4, P5, P6, M1, M2, M3, D1, D2
Problem solving	P1, M1, P2, P3, M2, P5, P6, D2
Time management	P2, P3, P4, P5, P6, M2, M3, D1, D2
Critical thinking	P1, M1, P2, P3, M2
Negotiation	P2, D2
Decision making	P1, P2, P3, P4, P5, P6, M1, M2, M3, D1, D2

MEANINGFUL EMPLOYER INVOLVEMENT - a requirement for the Diploma (Tech Level) qualifications

The 'Diploma' qualifications have been designed to be recognised as Tech Levels in performance tables in England. It is a requirement of these qualifications for centres to secure for every learner employer involvement through delivery and/or assessment of these qualifications.

The minimum amount of employer involvement must relate to at least one or more of the elements of the mandatory units.

Eligible activities and suggestions/ideas that may help you in securing meaningful employer involvement for this unit are given in the table below.

Please refer to the *Qualification Handbook* for further information including a list of activities that are not considered to meet this requirement.

Meaningful employer involvement	Suggestion/ideas for centres when delivering this unit
1. Learners undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification.	Learners' work-experience could be in an experienced team; they could contribute to, or observe activities, such as documentation scrutiny, observation and questioning used to elicit the business requirements for a system. Learners could also contribute to the development of the systems analysis documentation, following the organisation's approach. They could also contribute to the development of the elements of the logical and physical design and provide some input to the presentation.
2. Learners undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s).	Learners could engage in a project, set by the analyst, where they would carry out a realistic range of activities, such as designing questionnaires for stakeholders, identifying relevant issues from the current documentation to identify business requirements and analyse their findings. Using the three view model, learners could provide the necessary design and communicate it to a client, possibly the systems analyst. From this, learners could create the logical and physical design, present it to the client and refine it in the light of the feedback received.

<p>3. Learners take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures.</p>	<p>The systems analyst could provide insight into the importance of the various elements of the systems development and their strengths and weaknesses. Learners could be given examples of documentation, questions and answers from real projects, and be shown how they are interpreted. It is important learners are taught about the positive, where it worked and the disaster where they did not. This helps learners to understand that this is not an exact science but each project has its own difficulties and triumphs. The systems analyst could also provide examples of the use of documentation to record the findings of the investigations and to create the logical and physical design, including stories of successes and failures.</p>
<p>4. Industry practitioners operating as 'expert witnesses' that contribute to the assessment of a learner's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.</p>	<p>The systems analyst could observe elements of a centre based project or observe learners working on real projects in the work place. It is important that the expert witnesses knows to include ephemeral communication skills and methods as well as demonstration of skills such as questioning, document scrutiny and the creation of designs.</p>

To find out more

ocr.org.uk/it

or call our Customer Contact Centre on **02476 851509**

Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**



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