AS/A Level Applied Information and Communication Technology 9713
Unit 4: Systems life cycle

Recommended Prior Knowledge
Students will require knowledge of the systems analysis stages analysis, design, testing, implementation and evaluation.

Context
This section is the fourth in the syllabus and completes the knowledge required for AS level.

Outline
This section covers the elements of the systems analysis and design cycle.

AO	Learning outcomes	Suggested Teaching activities	Learning resources
4a	Analysis	Different methods of researching a situation	This is a PowerPoint presentation which contains slides about all aspects of the Analysis phase. www.business.auburn.edu/~laoseki/CHAP03-student.ppt
		Observation The point of observation is to see who does what in an organisation and what information they do it with. By simply watching people working it is also fairly straightforward to watch how data flow around a system. Observers have to be careful of the Hawthorne effect. This is where workers modify their behaviour because they know they are being watched. The aim of observation is to find out what actually happens, not what the workers think observers expect to see.	This explains the need for observation. http://www.business.auburn.edu/~laoseki/CHAP03-student.ppt#333,31,Other%20Fact-Finding%20Techniques

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		Examination of documents All documents which are used within a system need to be examined. These will be eventually duplicated or replaced with alternative versions or even discarded in the new system. The types of document which need to be examined are – Data capture forms, system documentation, business reports, invoices, bills, letters etc.	Documents which need to be examined/ reviewed are listed here. http://www.business.auburn.edu/~laoseki/CHAP03-student.ppt#329,30,Other%20Fact-Finding%20Techniques
		Questionnaires The use of questionnaires is a very popular method of fact finding. A great deal of time is spent on preparing questionnaires in order that the right type of question is asked in order that the most relevant information is gathered.	Factors to bear in mind when creating a questionnaire are given here. http://www.business.auburn.edu/~laoseki/CHAP03-student.ppt#330,32,Other%20Fact-Finding%20Techniques
		Interviews This method is used in some form in gathering information in every situation. A great deal of time and energy is spent on producing the most appropriate 'script' or lists of questions. An interview can take more time to organise and it is extremely difficult to repeat so it is vital that the questions asked are the right ones. Opposite is a link to a comprehensive guide to interviewing. It introduces the need to: Determine the people to interview, establish objectives for the interview, prepare for the interview, conduct the interview, document the interview, evaluate the interview and what causes unsuccessful interviews.	Slides 20-28. http://www.business.auburn.edu/~laoseki/CHAP03-student.ppt#314,20,Interviews
		Establishing the inputs, outputs and processing in the existing system After all the fact finding methods have been completed and the results are collated the next stage is to use these to define all the inputs, outputs and	These are factors worth considering. http://en.wikibooks.org/wiki/Systems

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		processing which are employed in the existing system.	_Theory/Inputs-Outputs#Systems_Defined
		Identify the sources and volume of input data and collection methods. By examining all the documents, this will enable the systems analyst to identify the documents which are currently being used to input data to the existing system. Observation will enable the systems analyst to determine the frequency of the addition and/or deletion of records. Identify manual and computer procedures necessary to achieve the current output.	
		Recording information about the current system It follows that there is a need for recording the facts since keeping accurate records is essential. The basic rule is write it down. Here follows some guidelines for good documentation. The first is that information must be recorded as soon as possible. The simplest recording method should be used and the work must be understandable. Documentation material must be organised. The best way of doing this is to use data flow diagrams (both Level 0 DFD – context diagram and Level 1 DFD – current system), system flowcharts	This gives a simple example of different levels of DFD. Only Context diagrams, level 0 and level 1 need to be studied. http://www.uccs.edu/~ahickey/courses/is470/Ch08b_NoFig.ppt#264,3,Data%20Flow%20Diagram%20Set
		Identifying problems with the current system Observation, examination of documents, questionnaires, interviews all contribute to the creation of DFDs which will help the systems analyst to identify current problems.	These have to be noted in the management report. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#308,26,Report%20to%20Management
		Identifying suitable hardware and software for a new system Analysing required outputs, storage and processing requirements using the DFDs will allow the Systems Analyst to make generalised recommendations for the software and hardware.	This sums up this phase. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap1

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			4.ppt#307,25,System%20Requirements
		Identifying the user and information requirements Collating the interview transcripts, questionnaires and documents will enable the systems analyst to identify what the user requires and what information the system will require.	These also get mentioned in the management report. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#308,26,Report%20to%20Management
4b	Design		This site introduces the design phase. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#271,27,Phase%203:%20Design
		Specifying the required hardware and software Volume of data will determine the choice of output devices. The order that data will be output will affect choice of storage devices.	These slides suggest how to consider the hardware and software specification. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#280,28,Build%20or%20Buy? http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#281,30,Acquire%20Hardware/Software

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		Designing data collection forms, screen layouts These will depend on the user requirements as well as output required from system and file structures.	This page suggests how thes ecould be considered. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#310,31,Input%20Output
		Designing report layouts and screen displays The content and presentation of reports, layouts and screen displays will depend on the requirements of the users	Similarly. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#310,31,Input%20Output
		Designing validation routines The form of input and file structures will determine these. Although not many resources on systems analysis mention the need to design these they are very important.	
		Designing the required data/file structures and programming specifications; The data structures and programming will depend on the types of processing and input and output structures	These are some factors to consider. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#312,33,Files%20and%20Databases slides 34 and 35 need to be looked at also.
4c	Development and testing		This slide sums the need for this section. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap1

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			4.ppt#272,36,Phase%204:%20Development
		Creating data structures, program modules	This link suggests how to initiate the programming phase. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#314,37,Programming
		Testing strategies Each module will need to be tested with different types of test data. Types of test data to be used are: Testing each module with normal data - data which is acceptable and will not generate error messages. Testing each module with live data - data which is already being used in the existing system. Testing each module with abnormal data – data which is outside acceptable ranges or is of the wrong data type. Testing each module with extreme data – data which is at the extreme boundaries of a range. The system will also need to be tested as a whole. **Improvements that could be needed as a result of testing** Prior to the implementation any improvements which might be needed are made to the system in the light of the testing of the system. These could be amended data structures or even amended program modules.	This page suggests how testing should be organised. http://www.mc.maricopa.edu/dept/d07/cis105faculty/PPT_CIS105/chap14.ppt#315,38,Testing
4d	Implementation	**Identify the different methods of system implementation** **Parallel running**	Features are described here.

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		The existing system and the new system are run together until there are no mistakes with the new one.	http://www.soc.staffs.ac.uk/jws1/MSc%20SAD/Lectures/System%20Testing.ppt#279,21,Parallel%20running
		Direct changeover The existing system is replaced by the new one without any 'running in' period.	Features are described here. http://www.soc.staffs.ac.uk/jws1/MSc%20SAD/Lectures/System%20Testing.ppt#278,20,Direct%20changeover
		Phased implementation This is parallel running on a small scale only part of the system is introduced to run alongside the existing system. When that works the next part or phase of the system is introduced. The existing system is gradually replaced by the new system.	Features are described here. http://www.soc.staffs.ac.uk/jws1/MSc%20SAD/Lectures/System%20Testing.ppt#281,23,Phased%20implementation
		Pilot running The new system is operated in one area of the organisation only until it is working properly and then another area has it introduced.	Features are described here. http://www.soc.staffs.ac.uk/jws1/MSc%20SAD/Lectures/System%20Testing.ppt#280,22,Pilot%20running
4e	Documentation	**Designing and developing elements of technical documentation** Developing systems documentation (results of systems analysis, what is expected of the system, overall design decisions, test plan and test data) Developing program documentation (description of the software, purpose of the software, input data formats, output, flowcharts, program listing, notes to assist future modifications)	

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		Designing and developing elements of user documentation A guide to simple elements of use of the software and hardware making up the system	This and the next two slides describes user documentation, here described as handover documentation as it is 'handed over' upon implementation of the system. http://www.soc.staffs.ac.uk/jws1/MSc%20SAD/Lectures/System%20Testing.ppt#260,24,Handover%20Documentation
4f	Evaluation	**Evaluating a new system in terms of the efficiency, ease of use and appropriateness of the solution** There are several ways a system can be evaluated: Using test results to evaluate the solution. A comparison has to be made of the actual results together with the expected results. If the results are not as expected refinements may be needed. Obtaining feedback from the user. For an effective system it would be expected that this would be positive. The results of this evaluation are used to identify limitations of the system. Using these limitations improvements can be made to the system.	